Chapter Nine
AIR QUALITY

INTRODUCTION

Purpose of this chapter

9.1 Chapter nine of Enviroparks' 2008 ES considered the potential air quality impacts of the proposed development. Changes in both the nature of the materials to be treated at the site, and in the number of different technologies used to treat them, require that this chapter be extensively reviewed. As such, this chapter replaces the original chapter nine and details the sources and nature of the emissions to atmosphere from the revised Enviroparks operations and processes. Enviroparks Wales Limited has secured an Environmental Permit from Natural Resources Wales for the Phase I processing operations, and the site will require this to be extended to encompass all of the proposed waste and energy creation activities. Enviroparks will operate in strict accordance with this Permit. Through identifying and quantifying the likely emissions for the purpose of this ES Addendum, it is possible to undertake a comprehensive assessment of their likely impact on the surrounding area, and thus to assess whether or not the impacts of the proposed operations are of an acceptable order.

9.2 The Enviroparks scheme aims to use waste as a resource. Most people would agree that, after the reduction of waste production, reuse and recycling are the most positive methods of waste control, and the ethos of the Enviroparks scheme remains the recovery of materials for recycling, prior to the recovery of energy from the residual fraction by using the waste as a fuel in an advanced thermal treatment process. However, where previously, incoming waste was from a range of sources including municipal kerbside collections and animal by-product wastes, materials now will include only commercial and industrial, and pre-sorted materials, which will have a reduced and less odorous biogenic content. The incoming material will be comprehensively processed, and recyclates will be recovered before the residue is further treated to produce a gasifier fuel. The fuel is transported internally on a conveyor system into a fuel storage bunker, awaiting use in the on-site gasification process. All of the waste handling, sorting, and treatment facilities are located within contained units, however the key processes which could have a potential impact on air quality are:

- Ventilation releases from operational buildings. The main waste reception and handling building (the Fuel Preparation Hall) and the Gasification Hall will require ventilation, although the ventilation air from the Fuel Storage Hall will be used as combustion air for the gasification plant;
- Emissions from the three-line gasifier plant which, coupled with a turbine create the electricity;
- Fugitive emissions from around the site;
- Emissions from road transport.

It is noted that the revised scheme has no requirement for flares.

METHODOLOGY USED

9.3 The methodology employed in the preparation of this chapter is based on, and is similar to the methodology applied previously within the 2008 ES and supporting documents, which is considered to remain current and appropriate. The assessment begins with the provision of background information, which will include a description of the processes and resultant pollutants from the site. Information on the current air quality standards, objectives and guidelines which apply to the pollutants to be released from the plant is provided, as is detail on the current air quality in the vicinity of the site.

9.4 The chapter then considers the likely impacts from the proposed development and includes details on the management systems in place for their control. An atmospheric dispersion model has been prepared to determine the dispersion characteristics of the emissions from the gasification lines, and this applies the ADMS model. ADMS is one of the leading atmospheric dispersion models available in the UK and is an accepted method of assessing the impact on ambient pollutant concentrations from industrial installations. The modelling enables an assessment of the potential impact of the proposed operations, and includes consideration of the potential cumulative impact from weather conditions, terrain effects and other existing and proposed developments in the area. Assumptions made include the combined and continuous operation of the three site gasifiers to ensure that the assessment is suitably robust, and similar worst case assessments of the cumulative contributions from new and planned local facilities.

9.5 Calculations on the likely difference in greenhouse gas emissions from the current and proposed waste management activities are included. Finally, a description of the proposed mitigation methods and an assessment of any additional requirement for mitigation will be provided.

BASELINE ANALYSIS

Proposed Operations

9.6 The processes now proposed for the Enviroparks facility are detailed in Table 9.1 below, and the potential releases to air associated with each process are listed.

Table 9.1: Proposed Processes and their Associated Releases

Process	Primary Potential Releases to Atmosphere
Construction	Dust from earth movement works, aggregate handling, foundation piling and site traffic on paved and unpaved roadways.
Road traffic; during both construction and operation	Combustion emissions from vehicle engines: Benzene, 1,3-Butadiene, Carbon Dioxide, Carbon Monoxide, Oxides of Nitrogen, Particulate Matter, Sulphur Dioxide, Volatile Organic Compounds.
Waste acceptance, sorting, and pre-	Materials enter the site in covered vehicles before being off-loaded, handled and treated within enclosed buildings. The lower and much changed biogenic content of the incoming material will reduce the potential for odorous

treatment	emissions, however the Fuel Storage Hall will be ventilated to the gasifiers in order to minimise any potential for odours to escape the building. A dust suppressing foam will also be used in the Fuel Preparation Hall.
Process	Primary Potential Releases to Atmosphere
Waste gasification	Abated emissions from the advanced thermal treatment of fuel from waste: Ammonia, Carbon Dioxide, Carbon Monoxide, Dioxins and Furans, Heavy Metals, Hydrogen Chloride, Hydrogen Fluoride, Oxides of Nitrogen, Polycyclic Aromatic Hydrocarbons, Poly Chlorinated Biphenyls, Particulate Matter, Sulphur Dioxide, Volatile Organic Compounds. Emissions constitute point source releases to atmosphere from the site and will be discharged through exhaust stacks.
Fugitive emissions	Controlled receipt, handling and processing of the in-coming materials should minimise the potential for fugitive release of odour or litter, and as all operational areas of the site will be laid to hardstanding, it is unlikely that large quantities of dust will be created by the activities.

Legislation

9.7 The EU National Emissions Ceilings Directive (2001/81/EC) sets limits on total annual emissions of important air pollutants for all Member States to help reduce transboundary air pollution, and the United Nations Economic Commission for Europe (UNECE) Convention on Long Range Transboundary Air Pollution (Gothenburg Protocol) now sets national emission reduction targets, including for fine particulate matter, to be achieved by 2020. The UK is currently compliant with its 2010 national emission ceilings for air pollutants. As a UN Convention, the Gothenburg Protocol will continue to be taken into consideration in UK Policy in the future, irrespective of our relationship with Europe, and the National Emissions Ceilings Directive is considered too important an issue at a national level to be amended as and when the UK leaves the European Union. Hence emissions from all sources, must be controlled and minimised where possible, in order to meet our national objectives.

9.8 In 2008, European Directive 2008/50/EC on ambient air quality and cleaner air for Europe came into effect (the CAFÉ Directive), and includes the following elements:

- The merging of most of the existing legislation into a single directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives. In essence, the 2008 Directive merges the requirements of Directive 96/62/EC, Directive 1999/30/EC, Directive 2000/69/EC, and Directive 2002/3/EC, as well as incorporating new requirements.
- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure related objectives.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.

9.9 The 2008 Directive therefore continues to have the general aim of identifying the basic principles of a common strategy across the Member States, to:

- Define and establish objectives for ambient air quality in the Community designed to avoid, prevent or reduce harmful effects on human health and the environment as a whole,
- Assess the ambient air quality in Member States using common methods and criteria,
- Obtain adequate information on ambient air quality and ensure that it is made available to the public, inter alia by means of alert thresholds,
- Maintain ambient air quality where it is good and improve it in other cases.

9.10 By incorporating the earlier Directives, the 2008 Directive sets a framework of how the UK must monitor and report ambient levels of air pollutants. The UK has been divided into zones and agglomerations within which the pollutants will be monitored, and sets specific limits for ambient concentrations of various pollutants including nitrogen dioxide and oxides of nitrogen, sulphur dioxide, lead, particulate matter, benzene, carbon monoxide, and ozone.

9.11 Directive 2004/107/EC (the fourth Air Quality Daughter Directive) was not included within European Directive 2008/50/EC, but remains in existence and sets ambient air limit values for arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons. The requirement for industry to meet emissions concentrations are therefore based on both industrial regulation implemented through the EU Industrial Emissions Directive (2010/75/EC) and transposed into UK law through the Environmental Permitting Regulations (SI 2010 No: 675 as amended), but also through the requirements for local areas to meet set levels of air quality.

9.12 The European Air Quality Directives inform the UK Air Quality Standards Regulations. The Air Quality Standards (Wales) Regulations 2010 (SI 2010 No. 1433 (W.126) came into force on 11 June 2010, replacing the previous (2007) Standards. The 2010 Regulations incorporate the CAFÉ Directive and the Fourth Daughter Directive, and specify the following limits:

Table 9.2: Summary of the National Air Quality Strategy Objectives

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured As	
Benzene	5.00 µg m^{-3}	Annual mean	31 December 2010
1,3-Butadiene	2.25 µg m^{-3}	Running Annual Mean	31 December 2003
Carbon Monoxide	10.0 mg m^{-3}	Maximum daily running 8 Hour Mean	31 December 2003
Lead	0.25 µg m^{-3}	Annual mean	31 December 2008
Nitrogen dioxide	200 µg m^{-3} not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 µg m^{-3}	Annual mean	31 December 2005
Particles (PM10) (gravimetric)	50 µg m^{-3}, not to be exceeded more than 35 times per year	Daily Mean	31 December 2004
	40 µg m^{-3}	Annual mean	31 December 2004

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured As	
Particles (PM2.5) (gravimetric) * All authorities	25 µg m^{-3} (target)	Annual mean	2020
	15% cut in urban background exposure	Annual mean	2010 - 2020
Sulphur Dioxide	350 µg m^{-3}, not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg m^{-3}, not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004
	266 µg m^{-3}, not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
Polycyclic Aromatic Hydrocarbons (PAH) *	0.25 ng m^{-3}	Annual mean	31 December 2010

* not included in regulations
Shaded data shows new objectives

Table 9.3: UK Air Quality Objectives for Protection of Vegetation and Ecosystems

Pollutant	***Air Quality Objective***		***To be achieved by***
	Concentration	Measured As	
Nitrogen dioxide (for protection of vegetation & ecosystems) *	30 µg m^{-3}	Annual mean	31 December 2000
Sulphur Dioxide (for protection of vegetation & ecosystems) *	20 µg m^{-3} 20 µg m^{-3}	Annual mean Winter Average (Oct - Mar)	31 December 2000
Ozone *	18000 µg m^{-3}.h	AOT40^{+}, calculated from 1h values May-July. Mean of 5 years, starting 2010	01 January 2010

Table 9.4: Target values for Arsenic, Cadmium, Nickel and Benzo(a)pyrene

Pollutant	Target value for the total content in the PM_{10} fraction averaged over a calendar year	Date by which target value should be met
Arsenic	6 ng m^{-3}	31 December 2012
Cadmium	5 ng m^{-3}	31 December 2012
Nickel	20 ng m^{-3}	31 December 2012
Benzo(a)pyrene	1 ng m^{-3}	31 December 2012

Further targets are also set for ambient concentrations of Ozone, however as Ozone will not be emitted by the Enviroparks process, these are not specified here.

9.13 Part IV of the Environment Act 1995 requires the UK Government and the devolved administrations for Scotland and Wales to produce a National Air Quality Strategy containing standards, objectives and measures for improving ambient air quality and to keep these policies under review. In Wales, this is implemented through the Air Quality (Wales) Regulations SI 2000/1940, which have since been amended by the Air Quality (Amendment) (Wales) Regulations SI 2002/3182. The Regulations establish the framework for achieving the required improvements in ambient air quality within a given time period.

9.14 Air quality in the UK has generally improved since 1997 when the first Air Quality Strategy was adopted. This was replaced, most recently, by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007, and provides an overview and outline of the UK Government and devolved administrations' ambient air quality policy. It sets out a way forward for work and planning on air quality issues, details objectives to be achieved, and proposes measures to be considered further to help reach them. The strategy is based on a thorough and detailed analysis of estimating reductions in emissions and concentrations from existing and proposed policies, aimed at achieving the specified objectives, which are based on health studies data for individuals within a population. As such, any exceedances of the objectives should be assessed in relation to the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present.

9.15 Information on the nature and potential effects of pollutants is presented in Appendix 9.1.

Local Air Quality

9.16 In line with Part IV of the Environment Act 1995 Rhondda Cynon Taf County Borough Council periodically review and assess the air quality in their area for compliance with National Air Quality Strategy objectives. A summary of the local air quality and monitoring requirements within the Borough is provided in Appendix 9.2.

9.17 The initial First Stage Report of the Air Quality Review and Assessment prepared by Rhondda Cynon Taf in December 1998, considered that there was a possibility that the National Air Quality Strategy (NAQS) Objectives for Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2) and Particulate Matter (PM_{10}) could be breached. Further investigation concluded in 2000, that the objectives were unlikely to be breached, and no Air Quality Monitoring Areas (AQMAs) were declared. However, although the concentration of pollutants in the area are generally well below the health based standards, AQMAs have subsequently been declared in some areas of the Borough, largely due to road traffic emissions in congested areas, and monitoring is undertaken to assess the ambient air quality. In addition the Council is continuing to investigate levels of PM_{10}, associated with local quarrying activities, within the community of Glyncoch.

9.18 In response to breaches of the Air Quality Objectives for Nitrogen Dioxide, the Council has declared fifteen Air Quality Management Areas, none of which is local to Hirwaun:

- Aberdare Town Centre Air Quality Management Area

- Broadway Air Quality Management Area
- Church Village Air Quality Management Area
- Cilfynydd Air Quality Management Area
- Cymmer Air Quality Management Area
- Llanharan Air Quality Management Area
- Llantwit Fardre Air Quality Management Area
- Llwynypia Air Quality Management Area
- MountainAshTown Centre Air Quality Management Area
- Mwyndy Air Quality Management Area
- Nightingales Bush Air Quality Management Area
- Ferndale Air Quality Management Area
- Nantgarw Air Quality Management Area
- Pontypridd Town Centre Air Quality Management Area
- Tylorstown Air Quality Management Area

9.19 Monitoring local to the proposed development site is restricted to diffusion tube monitoring for NO_2, in Penderyn. Ratified data from 2015 ranged on a monthly basis from 6 – 13 µg m^{-3}, and averaged 8.5 µg m^{-3}. The general trend is for a reduction in the levels of NO_2 in air with time.

Planning Policy

9.20 When considering potential developments and the protection and improvement of the environment, the Planning Policy Wales document, Edition 9 – November 2016[(1)] notes that planning and environmental management are separate but complementary. By controlling where development can take place and what operations may be carried out, the planning system has an important role in avoiding or minimising the adverse effects of any environmental risks on present or future land use. As such, where pollution considerations affect the use and development of land they can be material planning considerations.

9.21 Material considerations in determining applications for potentially polluting development are likely to include:

- Location, taking into account such considerations as the reasons for selecting the chosen site itself;
- Impact on health and amenity;
- The risk and impact of potential pollution from the development, insofar as this might have an effect on the use of other land and the surrounding environment;
- Prevention of nuisance;
- Impact on the road and other transport networks, and in particular on traffic generation.

9.22 Planning authorities may use planning conditions or obligations to meet planning aims to protect the environment where these are pertinent to the development proposed. It is however, important for planning authorities to understand the scope and purpose of conditions that can be imposed by pollution authorities so as to ensure that planning conditions neither duplicate nor conflict with such conditions. Proposed development should be designed wherever possible to prevent adverse effect to the environment but as a minimum to limit or constrain any effects that do occur.

9.23 Fundamentally, the Welsh Government's objectives are to:

- Maximise environmental protection for people, natural and cultural resources, property and infrastructure; and
- Prevent or manage pollution and promote good environmental practice.

9.24 Planning policies and proposals must therefore contribute to the protection and improvement of the environment, so as to improve the quality of life, and protect local and global ecosystems. In particular, planning should seek to ensure that development does not produce irreversible harmful effects on the natural environment. The conservation and enhancement of statutorily designated areas and of the countryside; the conservation of biodiversity, habitats, and landscapes; the conservation of the best and most versatile agricultural land; and enhancement of the urban environment all need to be promoted. **The development is designed to promote environmentally effective recycling and reduce the requirement for landfill. The development is located on a brownfield site, within an existing industrial estate which has good transport links. Site emissions and the environmental impact of operations will be minimised and controlled. As such, the development will not produce irreversible, harmful effects in the environment and should result in a minimal environmental impact on the local area.**

9.25 Further benefits of diverting residual waste from landfill sites and recovering energy, are identified by the Welsh Government in their Industrial and Commercial Sector Plan (2013)[(2)], which states that:

'Treatment of residual waste in high efficiency energy from waste facilities yield significant reductions in greenhouse gas emissions, as compared to other treatment options that include an element of landfilling, as verified by life cycle assessment studies.'

9.26 As such, the proposed Enviroparks development which aims to recover recyclable materials from incoming wastes, prior to using the residual fraction to produce energy, can be assumed to yield significant reductions in greenhouse gas emissions. The development is also in-line with the Government's Carbon Plan[(3)], which states that:

'The Government's aim is to get the most energy out of waste, not to get the most waste into energy recovery. Through effective prevention, re-use and recycling, residual waste will eventually become a finite and diminishing resource. However, until this becomes a reality, efficient energy recovery from residual waste can deliver environmental benefits and provide economic opportunities.' 'Efficient energy recovery from waste prevents some of the negative greenhouse gas impacts of waste in landfill and helps to offset fossil fuel power generation…'

9.27 The core values of Planning Policy Wales are reflected in the Rhondda Cynon Taf Local Development Plan[(4)]. The overall vision of the Rhondda Cynon Taf Local Development Plan was derived from the Rhondda Cynon Taf Community Strategy (2010 – 2020), which stated that:

'Rhondda Cynon Taf will be a County Borough of Opportunity. That means working together to enable individuals and communities to achieve their full potential, in terms of both their work and social life.'

The Local Development Plan presents an opportunity for the spatial planning system to deliver the aims and objectives of the Community Strategy.

9.28 The key planning objectives identified in the Local Development Plan include:

- Sustainable Communities – including providing housing and promoting integrated communities;
- Achieving Potential – with a focus on the development of a sustainable economy;
- Better Quality of Life – focused on the rich culture and heritage of the County Borough, and ensuring the protection and enhancement of the historic landscape of the Rhondda. This objective also aims to encourage a healthy and safe lifestyle, and to reduce the need to travel by car within Rhondda Cynon Taf;
- Develop and Protect the County Borough for Future Generations – including the protection of wildlife and countryside, managing the effects of climate change, minimising waste, and promoting the efficient and appropriate use of land, soil and minerals.

9.29 Policy AW 10 within the Local Development Plan, relates to environmental protection and public health, and states:

'Development proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and / or local amenity because of:-

1. Air pollution;
2. Noise pollution;
3. Light pollution;
4. Contamination;
5. Landfill gas;
6. Land instability;
7. Water pollution;
8. Flooding;

9. Or any other identified risk to the environment, local amenity and public health or safety unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and / or impact upon local amenity.'

9.30 The Plan goes on to note that pollution might cause significant damage to human health, quality of life and residential amenity, as well as affecting both the natural and built environment. Policy AW 10 is designed to ensure that developments that would result in unacceptably high levels of noise, light, water and / or air pollution are located away from residential areas and other sensitive uses, and that new development is not located in close proximity to existing sources of pollution.

Local Industry and Proposed Developments

9.31 Rhondda Cynon Taf has historically had a thriving coal industry, and the local Tower Colliery was established in 1864 and was successfully operated until the exhaustion of the workable underground reserves in January 2008. Some open-cast mining continues at the site. However, the Hirwaun area has had a long industrial history aside from mining. The site which Enviroparks (Wales)

Ltd propose to develop was an ordnance works during the Second World War, and other industries on the estate over the years include a concrete works, a glass factory, a radio factory, engineering works, a bakery and a meat factory, and chemical and pharmaceutical factories. Current industries in the immediate vicinity of the site include the Dwr Cymru Hirwaun Sewage Treatment Works, and Eden UK, which produces shop fittings and shelving. Other local industries include powder coating works, engineering companies, food processors, fencing manufacturers, electronics companies and metal pressers and spinners.

9.32 Located on an industrial estate, the Enviroparks development is in close proximity to operations that might have an impact on air quality. Eden UK, across Ninth Avenue from the site, holds a Local Authority Environmental Permit for its coating processes, from which the main regulated pollutant is PM_{10}. Other Local Authority Environmental Permits registered in or around Hirwaun include a coal handling Permit for Tower Regeneration Ltd, a coatings manufacturing Permit for Eftec Limited, which produces engineered materials and application systems for bonding, coating, sealing and damping in vehicles, and a wood product Permit application for the Celtic Communities Wood Fuel Limited. None of these installations and processes are expected to have a significant impact upon local air quality, due to their type, size and distance from existing Air Quality Management Areas or other vulnerable areas.

9.33 Since the 2008 ES, a number of energy plants have been constructed or proposed on the Hirwaun Industrial Estate. These include the Green Frog Short Term Operating Reserve (STOR) located off Main Avenue, and operational since 2012. Additionally, a Nationally Significant Infrastructure Project, Hirwaun Power was awarded a Development Consent Order in July 2015, for the development of an open-cycle gas turbine peaking plant to generate up to 299 MW_e, and Premier Green Energy Ltd has been awarded a change of use planning permission to develop a renewable energy generation facility comprising a pyrolysis plant for the conversion of non-hazardous mixed waste wood materials into 8 MW_e energy.

9.34 Several other new, proposed or committed developments have been identified in the area, including the Abergorki Wind Farm, situated on land to the North East of Forch-Orky; land remediation and reclamation of old tips, derelict land and buildings, surface coal extraction and associated ancillary development at the Tower Colliery site; potential development of the former Ferrari's Bakery site in Hirwaun, for which the site was sold at auction in July 2016 although there are no further details on whether or not the proposed development will progress at the site at this time.

9.35 Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2016 (SI 2016 No. 58) (W. 28) states that when preparing an environmental impact assessment, the environmental statement should include:

A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from—
(a) the existence of the development;
(b) the use of natural resources;
(c) the emission of pollutants, the creation of nuisances and the elimination of waste,
and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.

9.36 Allocated land within the Rhondda Cynon Taf Local Development Plan includes:

Policy NSA 8 - Land South of Hirwaun
Land is allocated South of Hirwaun for the construction of 400 dwellings, 36 hectares of employment, a new primary school, a retail store of 2000m^2 net floor space, medical /community centre and informal recreation contained in a landscape setting. Development on the Strategic Site will be subject to a large-scale reclamation scheme.

Policy NSA 9 - Housing Allocations
Land is also allocated in the Northern Strategy Area of Rhondda Cynon Taf for residential development on non-Strategic Sites in the following locations:
Land South of Rhigos Road, Hirwaun, a 0.57 hectare flat field situated on the edge Hirwaun, located behind a low density residential street has been identified for 15 Dwellings.

Policy NSA 21 - Park and Ride / Park and Share Provision
Provision for park and ride / park and share facilities will be provided on land to the South of Hirwaun.

9.37 Although allocated for development, these schemes are not yet in the planning system. The Local Authority applies a consistent and proportionate approach to their consideration of development applications which could either have the potential to adversely affect local air quality or introduce a relevant population to an existing area of potentially poor local air quality. Should a development meet the relevant criteria and it is proportionate to do so, the Local Authority will require an Air Quality Assessment to be produced in order to objectively examine the air quality implications of the proposed development, and to provide sufficient information to allow the Local Planning Authority to evaluate the material planning consideration. In this way, the Local Authority attempts to ensure that future developments will negate or mitigate any impacts on local air quality whilst continuing to treat each application for planning consent on its individual merits.

9.38 When considering the potential cumulative effects of proposed or committed developments in the Hirwaun area, the air quality assessment prepared for the ES Addendum has taken the following schemes into account:

Table 9.5: Cumulative Effects Considered

Development Name	Scheme	Consideration
Abergorki Wind Farm	Three wind turbines	Construction traffic impacts
Hirwaun Power	Gas fired 'peaking' power generating plant providing up to 299mwe	Construction traffic and operational emissions
Hirwaun Energy Centre	Wood pyrolysis energy plant	Operational emissions
Green Frog Connect Ltd,	STOR generator farm	Operational emissions

Other identified schemes have been assessed as having limited additional, or as having a reduced impact on current background air quality levels, e.g. reduced traffic movements at Tower Colliery, or

are considered to have insufficient information available for consideration e.g. the likely proposals for the Ferrari's Bakery site.

PREDICTION OF POTENTIAL IMPACTS

9.39 The proposed Enviroparks development at Hirwaun has the potential to predominantly impact on air quality in the following ways:

- Dust emissions (construction phase);
- Traffic emissions (construction and operational phases);
- Gasifier exhausts (operational phase);
- Potential odour emissions (operational phase).

Dust Emissions

During Construction

9.40 Dust emissions from the proposed development site will occur predominantly during construction. The main sources of dust include that generated from land stripping and excavation, piling and foundation works, aggregate and materials handling and preparation, and traffic movements across the site which will, periodically at least involve movement across open ground.

9.41 In order to assess the potential magnitude and impact of dust emissions from the construction of the Enviroparks facility, the following criteria will be applied, as taken from the Guidance on the assessment of dust from demolition and construction[(5)] from IAQM. It is noted, that although the site is partly developed, with Phase I of the scheme already built, there will be no demolition stage required for the development, and hence this detail has been omitted.

Table 9.6: Potential Magnitude and Impact of Dust Emissions

Stage	Small Scale	Medium Scale	Large Scale
Earthworks	• total site area <2,500m2, or • soil type with large grain size (e.g. sand), or • <5 heavy earth moving vehicles active at any one time, formation of stockpile enclosures <4m in height, or • total material moved <10,000 tonnes (where known), or	• total site area 2,500m^2 – 10,000m^2, • moderately dusty soil type (e.g. silt), or • 5-10 heavy earth moving vehicles active at any one time, or • formation of stockpile enclosures 4m – 8m in height, or total material moved 20,000 tonnes – 100,000 tonnes	• total site area >10,000m^2, • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), or • >10 heavy earth moving vehicles active at any one time on site, or • Formation of stockpile enclosures >8m in height;

	earthworks during wetter months	(where known).	• total material moved >100,000 tonne (where known).
Stage	Small Scale	Medium Scale	Large Scale
Construction	• total building volume <25,000m3, or • construction material with low potential for dust release (e.g. metal cladding or timber).	• total building volume 25,000m^3 – 100,000m^3, or • potentially dusty construction material (e.g. concrete), or • on-site concrete batching.	• total building volume >100,000m^3, or • piling, or • on site concrete batching; or • sandblasting.
Track-out	• <10 HDV (>3.5t) trips in any one day, • surface material with low potential for dust release, • unpaved road length <50 m.	• 10-50 HDV (>3.5t) outward movements in any one day, • moderately dusty surface material (e.g. high clay content), • unpaved road length 50 m – 100 m (high clay content).	• >50 HDV (>3.5t) outward movements in any one day, • potentially dusty surface material (e.g. high clay/silt content), • unpaved road length >100 m.

9.42 The earthworks required at the site will be classed as medium scale, due to the size of the site and the operations required. Construction and track-out impacts will be large scale, due to the size of the buildings, and the number of construction vehicle movements required at peak operation.

9.43 When assessing the sensitivity of dust and soiling effects from construction sites on people and property, the IAQM guidance[(5)] proposes the following matrix based on the number of receptors potentially exposed, their sensitivity, and the distance of those receptors from the source (site):

Table 9.7: Sensitivity of Dust and Soiling Effects

	Receptors	Distance from Source (m)			
Sensitivity	Number	< 20	<50	<100	<350
High	> 100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

9.44 The presence of human receptors (anglers; assumed 1 – 10 at any one time) around the Penderyn Reservoir (a high sensitivity receptor) with the embankment located 40 – 50 metres from the site boundary would suggest a medium overall sensitivity to dust impacts. Similarly, the sensitivity to human health impacts can be assessed through consideration of the annual mean particulate matter (PM_{10}) concentration. The background concentration of PM_{10} in the area is

recorded on the DEFRA background maps as 13.16 µg m^{-3}, which is below the level for assessment of the high sensitivity receptors as specified in the IAQM guidance[5]. As such, and with only two non-business sensitive receptors identified within 350 m of the site (the Penderyn Reservoir and the Dwr Cymru service reservoir) the sensitivity to human health impacts can be considered to be low.

9.45 Finally, the potential impact on ecological receptors can be considered. However, as the sensitive ecological sites are all located more than 50 m from the development site, the overall sensitivity is considered to be low. With a medium, low and low sensitivity class for the effects of dust and soiling effects, human health and ecological impacts respectively, the combined sensitivity of the area is considered to be low. Using this combined classification, the impact of any stage of the construction process can be assessed as follows to ascertain the overall risk:

Table 9.8: Impact of Construction Process

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Excavation			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Track-out			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

9.46 The overall risk of dust impacts from the construction activities at the proposed development site is therefore considered to be low.

9.47 Enviroparks has identified Dawnus Construction as Construction Advisors for the development works at the site. Dawnus Construction will work to an Environmental Management Plan produced specifically for the project and as necessary, any phasing of the works. This will consider the potential for emissions of dust to occur, and will identify any control measures, as part of the nuisance management controls section. A copy of the current Environmental Management Plan is included as Appendix 9.3, although it is noted that this is currently a rather high-level document and will be finalised ready for use prior to commencement of construction. Hence it is provided here only by way of identifying the issues to be considered, rather than providing detailed information on the site-specific controls to be employed. All construction staff and contractors will be subject to communication, training, monitoring and auditing of health, safety, and environmental issues across the construction site.

During Operation

9.48 The site will be operated in strict accordance with an Environmental Permit, to be obtained from and issued by Natural Resources Wales. As the site will be covered in hardstanding and landscaped areas once operational, the dust creation potential from the land will be negligible. Additionally, all materials delivery and handling operations will be undertaken within enclosed buildings and thus dust creation through operational practices will also be negligible. Within the Fuel Preparation Hall, a dust suppressing foam is applied during fuel preparation, and a de-dusting unit is proposed to ensure the comfort and occupational health of staff. The foam mixture, which is practically invisible, is dosed onto the shredded material and adheres to the dust making it heavy. The dust therefore settles and no further dust is created.

9.49 Enviroparks has a draft Environmental Management System (EMS), which has been prepared in the style of the ISO 14001 Standard. Although not currently operational, the Company intends to fully implement their management system once site operations commence, and will subsequently aim to gain certification of the system. The draft EMS includes a Dust Management Plan which details potential sources of dust, control measures and receptors, and actions to be taken in the event of a complaint. A copy of the plan is included in Appendix 9.4.

Odour Emissions

During Construction

9.50 Odour controls will be implemented similarly to the control of dust at the site through the use of an Environmental Management Plan implemented by Dawnus Construction. The potential for odour emissions from the construction activities is limited, with sources predominantly being from vehicle emissions during travel to, from and across the site, and also during operations, e.g. diggers, shovel loaders, piling equipment etc.

During Operation

9.51 Once operational, the site intends to control releases primarily through good site management practices. Similarly to considerations regarding the control of dust emissions, the draft Enviroparks EMS includes an Odour Management Plan which identifies how the site proposes to minimise the risk of odour issues, and identifies actions to be taken in the event that they occur. A copy of the plan is included in Appendix 9.5.

9.52 Feedstock materials will be delivered in heavy goods vehicles which may include curtain sided, tipper or walking floor / ejector type lorries. All vehicles must be covered when arriving at the site. Materials are accepted under contract and as such most deliveries will be scheduled to occur at staggered periods throughout the day, resulting in a well-controlled delivery and acceptance operation.

9.53 The majority of the feedstock material arriving at the site will be from commercial and industrial sources containing low levels of food waste and other putrescible materials, and thereby limiting the potential for the waste to generate odour. This is a significant change from the 2008

application and ES, where the majority of incoming materials were proposed to be municipal waste (including high levels of food waste) and animal by-products.

9.54 Whenever material arrives at the site, the delivery is dealt with as soon as possible. The aim is to receive between four and six deliveries per hour, and the delivery process includes material acceptance checks and weighing etc. A waiting area is provided for the delivery vehicles should they not be able to enter the delivery system immediately. Deliveries will usually be accepted on a first come first served basis, however should initial check-in and material acceptance procedures suggest that an incoming load would benefit from preferential treatment, for example due to issues with the load or the road network, Enviroparks retain the right to promote a load up the waiting list to ensure that it is not left standing unnecessarily. Enviroparks retains the right to refuse to accept any delivery which arrives at the site in an uncovered or poor state, and will reject outright any materials which are not acceptable under the terms of their Environmental Permit. The Enviroparks EMS includes draft pre-acceptance, acceptance, quarantine and rejection procedures. These will be finalised in line with Best Available Techniques during the application to amend the site Environmental Permit, and will be strictly adhered to once operations commence.

9.55 With the exception of the material acceptance checks, all waste handling operations are undertaken in enclosed buildings. Delivery vehicles are reversed up to the access doors, which are closed whenever they are not in use, and once the door is opened the vehicle manoeuvres into the off-load area. Once unloaded, the vehicle pulls away from the access point and the door is closed.

9.56 The dust suppressing foam applied during the preparation of the fuel also minimises the potential for odour to emanate from the waste. Once treated, segregated recyclates are stored in bunkers within the Fuel Preparation Hall, and are loaded into dedicated containers or collection vehicles within the main building, prior to dispatch, while the fuel for the gasification lines is transported internally on a conveyor within the building, into the Fuel Storage Hall.

9.57 The principles of odour control at the site are based on the use of enclosed operations, which is fully compliant with Rhondda Cynon Taf's proposed allocation of 'in-building' waste facilities on the Hirwaun Industrial Estate (Local Development Plan, Policy CS9), and also on the efficient handling of material to avoid unnecessary storage and increased potential for degradation of the wastes or fuels. Received wastes will be treated within two days and most wastes and recyclables for recovery will be bulked in the Fuel Preparation Hall until a vehicle load is ready for dispatch. This is usually achieved in less than two days after treatment, although metal wastes and inert wastes may be held for marginally longer. Wastes which are considered to have the potential to cause odours will be treated as a priority, stored at the site for no longer than two days, and in order to avoid situations that favour anaerobic breakdown and odours, the waste will be frequently turned. Prepared fuel for gasification is generally held for up to three days within the Fuel Storage Hall in order to ensure sufficient feed for the process, although a maximum of five day's storage is available for use during holiday and maintenance periods, for example.

9.58 Once the prepared gasifier fuel enters the Fuel Storage Hall, its retention and use is controlled by an automatic crane. The crane is programmed to select waste on a 'first-in-first-out' basis, which ensures that fuel is generally used within 3 days and aids in minimising the potential for odour build-up. Ventilation air from the Fuel Storage Hall will be used as combustion air within the gasification process to ensure the effective control of any potential emissions of odour.

9.59 Once accepted into the process, materials will remain in enclosed buildings or processes until such time as they are ready for dispatch. Neither wastes nor recyclates will be stored externally.

9.60 Combustion emissions from the gasification process are released at height and are controlled for optimum combustion, also thereby controlling the odour of the emissions. The main release stack is 45m in height and incorporate continuous monitoring systems for emissions concentrations. All operation and control will be in strict accordance with the requirements of European and Welsh legislation, and will be regulated through the provision of an Environmental Permit, to be issued by Natural Resources Wales.

Process Exhausts

9.61 The number of process exhausts from the site have reduced significantly with the revised scheme. The 2008 ES considered three engine releases discharged at 40 m, and four flares planned at 16.5 m high. The four flares served the engines which burned the gases produced by the site processes, and were due to operate during start-up and shut-down to ensure stable conditions and control emissions, and during emergencies, for example should an engine fail.

9.62 The rationalisation of the site energy production processes to three, identical gasification lines, removes the requirement for flaring, and results in only three discharge flues being required at the site, each serving a single gasification line, and incorporated into a single stack at 45 metres. Additionally, the proposed scheme now includes abatement systems, which were not proposed for the currently consented scheme. These include:

- Urea dosing for the reduction and removal of Oxides of Nitrogen;
- Lime dosing for the reduction and removal of acid gases (Sulphur Dioxide and Hydrogen Chloride);
- Activated Carbon dosing for the reduction and removal of Heavy Metals and Dioxins;
- Bag filtration for the reduction and removal of Particulate, including abatement residues.

9.63 The discharges from the flues have been modelled as previously, using a comprehensive dispersion model (ADMS Version 5.2) which enables the dispersion of the emissions from the flues to be predicted while taking into account details of the site and local area, such as terrain and meteorological conditions. The complete dispersion modelling report is presented in Appendix 9.6.

9.64 The model was prepared by inputting data on the anticipated releases from each of the three discharge stacks, and two sets of emissions data were considered, being the worst case emissions based on anticipated emission limits (as required by the Industrial Emissions Directive (2010/75/EC) and the Environmental Permitting Regulations (SI 2010 No: 675 as amended)), and reduced emissions which represent a more realistic, long term release from the gasification lines, as confirmed by the technology provider. Comprehensive information on the site buildings was also included, as was data of local terrain and meteorological conditions. The model provides data of the process contribution to ground level concentrations across a specified grid and as required, at identified sensitive receptor locations. For the purpose of this exercise, a 5 km x 5 km grid was produced, with 100 intersections across each axis, resulting in 10,000 grid results being reported, or 1 every 50 m along each axis. The Enviroparks site was located at the approximate centre of the grid.

Additionally, a number of sensitive health or ecological receptors were included. The chosen receptors are detailed in Table 9.9 below and are designed to represent those locations where members of the public are likely to be regularly present and hence potentially exposed to pollutants over the relevant averaging period of any associated assessment level, or where sites are Designated (SACs, SPAs, SSSIs) and are located within 10 km of the Enviroparks facility.

Table 9.9: Sensitive Receptors Considered

Receptor Number	Receptor Name	Grid Reference		Location from Stack	
		X (m)	Y (m)	(m)	Direction
1	Blaen Cynon Cors Bryn-Y-Gaer SSSI / SAC	294600	206600	787	E
2	Cwm Cadlan SAC	296100	209800	3,736	NNE
3	Coedydd Nedd a Mellte SAC	291900	209300	3,151	N
4	Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI	291963	209323	3,131	NW
5	Cwm Gwrelych and Nant Llynfach Streams SSSI	290552	205212	3,665	W
6	Craig-y-Llyn	291766	203223	4,155	SSW
7	Bryn Bwch SSSI	292056	210947	4,497	NNW
8	Caeau Nant-y-Llechau SSSI	290178	210332	5,077	NW
9	Gweunedd Dyffern Nedd SSSI	291466	211553	5,296	NNW
10	Bryncarnau Grasslands Llwyncoed SSSI	299833	206502	5,996	E
11	Blaenrhondda Road Cutting SSSI	293072	200784	6,086	S
12	Blaen Nedd SSSI	291639	213639	7,166	NNW
13	Ogof Ffynnon Ddu Pant Mawr SSSI	288138	215120	10,072	NNW
14	Caeau Ton-y-Fildre SSSI	286271	210738	8,527	WNW
15	Penmoelallt SSSI	301713	209502	8,312	NE
16	Mynydd Ty-Isaf Rhondda SSSI	292851	196797	10,073	S
17	Plas-y-Gors SSSI	292106	215519	8,870	NNW
18	Daren Fach SSSI	301914	210477	8,859	NE
19	Cwm Glo a Glyndyrys SSSI	303248	205630	9,478	E
20	Waun Ton-y-Spyddaden SSSI	286404	212193	9,178	NW
21	Gorsllwyn Onllwyn SSSI	285408	210752	9,308	W
22	Cwm Taf Fechan Woodlands SSSI	303945	208684	10,270	NE
23	Nant Llech SSSI	283539	212245	11,646	NW
24	Caeau Nant Y Groes SSSI	302833	202232	10,092	SE
25	Tir Mawr A Dderi Hir, Llwydcoed SSSI	298270	206284	4,457	E
26	Penderyn Reservoir	293839	207170	349	N
27	Eden UK	294020	206800	176	E
28	House at Penderyn Reservoir	294100	207270	516	N
29	Ty Newydd Hotel	294600	206940	764	ENE
30	Caer Llwyn Cottage	293253	207151	678	NW
31	Rhombic Farm	292958	206712	894	W
32	Castell Farm	292871	206783	975	W
33	TY Newydd Cottage	294514	207025	699	NE
34	Residence Woodland Park	294824	207560	1,227	NE

Receptor Number	Receptor Name	Grid Reference		Location from Stack	
		X (m)	Y (m)	(m)	Direction
35	Pontbren Llwyd School	295057	208264	1,884	NNE
36	Ffynnon Ddu (spring)	292273	208364	2,203	NNW
37	Ton-Y-Gilfach	289565	208712	4,679	NNW
38	Rose Cottage	291284	208150	2,885	NNW
39	The Don Bungalow	291512	207044	2,344	W
40	Werfa Farm	291944	206721	1,904	SW
41	Willows Farm	294129	205879	984	SSE
42	Trebanog Uchaf Farm	294063	207416	634	NE
43	Tai-Cwpla Farm	293519	207024	384	NNW
44	Neuadd Farm	294906	207282	1,157	NE
45	John Street Allotments, Hirwaun	296180	205605	2,633	SE
46	Dwr Cymru Service Reservoir	294068	206939	252	NE

9.65 Models initially retained the original stack height of 40 m. However, with modifications to some of the site buildings, including an increase in height, it was considered more appropriate to increase the height of the release point to 45 m, and the dispersion modelling results are reported on that basis.

9.66 Various modelling scenarios have been run and include emissions at the anticipated limit values, anticipated longer term discharge rates, abatement failure scenarios, and models to assess the impact of cumulative operations on the Hirwaun Industrial Estate. Table 9.10 presents the maximum results experienced over the modelled grid over the course of five years (meteorological data for 2011 – 2015 has been applied), for both the maximum and anticipated discharge rates:

Table 9.10: Summary of Initial Modelling Results

Pollutant	*Maximum Discharge*	*Likely Discharge*
Annual Average NOx as NO2 (ug/m3)	5.13	3.85
99.79 Percentile Hourly NOx as NO2 (ug/m3)	95.44	71.58
99.9 Percentile 15 Minute SO2 (ug/m3)	24.48	4.90
Annual Average SO2 (ug/m3)	1.240	0.247
99.73 Percentile Hourly SO2 (ug/m3)	21.64	4.33
99.18 Percentile 24 Hour SO2 (ug/m3)	6.51	1.30
90.41 Percentile 24 Hour PM10 (ug/m3)	0.5075	0.1521
Annual Average PM10 (ug/m3)	0.1865	0.0559
Annual Average PM2.5 (ug/m3)	0.2440	0.0731
8 Hour Rolling Average CO (mg/m3)	0.0012	0.00012
Maximum 8 Hour Rolling Average CO (mg/m3)	0.0346	0.0035
Annual Average VOC (ug/m3)	0.2565	0.0514
Annual Average Hg (ug/m3)	1.37E-03	1.96E-04
Annual Average Cd / Tl as Cd (ng/m3)	1.37	0.20
Annual Average Heavy Metals as Pb (ug/m3)	0.0127	0.0014
Maximum Hourly HCl (ug/m3)	6.82	4.77
Maximum Hourly HF (ug/m3)	0.715	0.284

Pollutant	Maximum Discharge	Likely Discharge
Annual Average Dioxins (ug/m3)	2.57E-09	2.57E-10
Annual Average PAH (ng/m3)	0.0255	0.0255
Annual Average PCB (ug/m3)	1.27E-04	1.27E-04
Annual Average NH3 (ug/m3)	0.239	0.239

9.67 The Environment Agency sets criteria for considering the impact of process contributions to ambient air, which states that process concentrations equating to less than 1 % of the long-term assessment level, or 10 % of the short-term level can be screened as insignificant. When modelling the process contributions predicted to occur when discharging the maximum allowable emissions from all three gasification lines, the following pollutants were screened as insignificant:

- Sulphur Dioxide (health impacts);
- Particulate (PM_{10} and $PM_{2.5}$);
- Carbon Monoxide;
- Mercury;
- Hydrogen Chloride;
- Hydrogen Fluoride;
- Ammonia.

9.68 Process contributions of the following emissions could not be screened as insignificant:

- Nitrogen Dioxide (health or vegetation impacts);
- Sulphur Dioxide (impacts on sensitive vegetation);
- Benzene;
- Heavy Metals;
- Cadmium;
- PAH.

9.69 Important points to note when considering the pollutants which are not readily screened as insignificant from the initial modelling are:

i) All Oxides of Nitrogen (NO_x) are assumed to be Nitrogen Dioxide. In reality, only a fraction of the release will be NO_2, and Natural Resources Wales apply the following methodology;

- for short-term process contributions and predicted environmental concentrations, assume that only 50 % of emissions of NO_x convert to NO_2 in the environment;
- for long-term process contributions and predicted environmental concentrations, assume all NO_x convert to NO_2.

ii) The release identified as Benzene is actually a total Volatile Organic Compound release, of which Benzene will only comprise a fraction. Similarly, the release of Cadmium actually represents Cadmium and Thallium, and that of Heavy Metals is a single release which comprises nine metal species. Thus, the actual contribution of individual species compared to a relevant Environmental Quality Standard, is less than calculated, although the exact contributions cannot be confirmed.

9.70 A second stage screening test is then applied to consider whether or not further investigation is required. Where pollutants meet both of the following requirements no further assessment of a substance is required:

- the short-term PC is less than 20 % of the short-term environmental standards minus twice the long-term background concentration;
- the long-term PEC is less than 70 % of the long-term environmental standards.

9.71 When applying this second stage screening test, the only pollutant which does not pass the criteria is Nitrogen Dioxide, the short-term process contribution of which (at 50 % NO_x release) is approximately 25 % of the long-term Environmental Quality Standard minus twice the background concentration. The long-term predicted environmental concentration does however remain well within 70 % of the Environmental Quality Standard. It is also noted that, despite not passing this second stage screening test, reductions in the Nitrogen Dioxide discharges modelled for the revised scheme result in lower process contributions than calculated in the 2008 assessment, and therefore the environmental impact of the current proposals will result in a positive impact on Nitrogen Dioxide levels in ambient air than are already acceptable under the consented scheme.

9.72 Detailed modelling has been undertaken of forty-six sensitive receptors located up to approximately 10 km from the Enviroparks site. These sensitive receptors represent local areas where members of the public may be present for prolonged periods, e.g. residential properties, farms, and neighbouring Eden UK, sensitive infrastructure including both the Penderyn Reservoir and the Dwr Cymru service reservoir located immediately north of Eden UK, and sensitive ecological receptors including the Special Areas of Conservation and the Sites of Special Scientific Interest, situated within 10 km of the Enviroparks development.

9.73 A similar two stage screening assessment has been applied to the detailed modelling results at the specified receptors and, although some pollutants at some locations can be screened as insignificant by the primary assessment methodology, the following pollutants required the secondary screening test for some locations:

- Nitrogen Dioxide;
- Volatile Organic Compounds;
- Cadmium;
- Heavy Metals;
- PAH.

9.74 The secondary screening assessment resulted in all pollutants passing the assessment with the exception of Nitrogen Dioxide when considering all of the NO_x as NO_2. When the short-term concentration is halved as per the Natural Resources Wales guidance, the only receptor that cannot be screened in its entirety is Eden UK, the short term hourly process contribution of which is 10.8 % of the Environmental Quality Standard, against a screening value of 10 %. The same short-term contribution as a percentage of the Environmental Quality Standard minus twice the long-term background is within 20 %, and the long-term predicted environmental concentration remains within 70 % of the Environmental Quality Standard. Similarly to the gridded results, the reductions in the Nitrogen Dioxide discharges modelled for the revised scheme result in lower process contributions than in 2008, and therefore the environmental impact of the current proposals will result in a

positive impact on Nitrogen Dioxide levels in ambient air than are already acceptable under the consented scheme.

9.75 As many of the sensitive receptors included in the model are identified for their special ecological status, consideration has been made to the levels of Nitrogen and Acid deposition at these sensitive sites. The process contributions to ambient air quality levels at most of the receptor sites can be quickly screened as insignificant, as already detailed above. In relation to the specific ecological receptors, the exceptions to this are emissions of NO_x as NO_2, Metals and Ammonia which can result in process contributions of above 1 % of the long-term Environmental Quality Standard at Blaen Cynon and Cwm Cadlan. All process contributions reported are less than 4.5 % of the relevant Environmental Quality Standard, and so although these cannot necessarily be immediately screened as insignificant, the process contributions remain very small in relation to the acceptable level of ambient air quality. When considering Nitrogen deposition at the sites, Blaen Cynon is predicted to receive more than 1 % of the lower critical load value when modelling both Nitrogen from NO_x (1.62 % of the lower critical load), and total Nitrogen from NO_x and Ammonia (4.58 % of the lower critical load). Deposited concentrations to each of the other sensitive ecological receptors can be screened as insignificant. As noted within the dispersion modelling report, the presence of Ammonia within the flue gas is a function of the inclusion of Selective Non-Catalytic Reduction (SNCR) techniques to abate emissions of Oxides of Nitrogen. SNCR doses a reagent, in this instance Urea, into the hot process gases, and the Urea reacts with the NO_x to form Nitrogen and water vapour. Such abatement was considered for the original scheme but was not included. It is however employed here, as it is considered to represent Best Available Techniques for the gasification technologies now proposed.

9.76 It is noted that, although the assessment of deposited Nitrogen above considers contributions from 100 % of the Oxides of Nitrogen release, Nitric Oxide does not deposit at a significant rate, and hence it is appropriate to halve the deposited quantities of NO_x in order to remove the Nitric Oxide contribution. When calculating the total Acid deposition, a combination of total Nitrogen and total Sulphur deposition (calculated from SO_2 and HCl deposition), this consideration has been made, and results in equivalent Acid deposition rates of 9.3 % of the lower critical load at Blaen Cynon, and 3.3 % of the lower critical load identified for Cwm Cadlan. The critical loads identified for the sites are 1.018 and 0.803 kg eq/ha/year respectively, and the contributions of 0.094 and 0.0262 kg eq/ha/year are a tiny fraction of the predicted environmental concentrations of Acid deposition at the sites. The current background levels already exceed the critical loads significantly, with 2.1 and 1.86 kg eq/ha/year identified for the two sites respectively.

9.77 As noted in paragraph 9.62, the proposed scheme now includes abatement systems to control emissions to atmosphere. Should these fail, a short term increased release of the otherwise abated emissions would occur, and therefore emissions of Nitrogen Dioxide, Sulphur Dioxide, Hydrogen Chloride, Heavy Metals, Dioxins and Particulates could occur. Emissions would potentially increase for a very short period while the issue is detected by the in-line continuous emissions monitoring equipment, and is corrected or the plant is shut-down. Modelling has considered the potential for short term releases due to such events, and has assessed the predicted environmental concentration at such times, against the Environmental Quality Standards. Where short-term Environmental Quality Standards exist for the modelled pollutants, most can be screened as insignificant when considering the second stage assessment, although short term levels of Nitrogen Dioxide cannot be. That said, the predicted environmental concentrations remain within the

Environmental Quality Standard, and equate to approximately 31.5 % of the Standard when modelling NO_2 as 50 % total NO_x. Coupled with the short-term nature of any such release which will be avoided by maintenance and will be corrected or the process reduced or shut-down as soon as practicable and until normal operations can be restored, these short-term potential releases from the failure of abatement systems are considered to have limited potential impact on human health or the environment.

9.78 Similarly, the cumulative impact on emissions to atmosphere from the Enviroparks scheme, the relatively new Green Frog STOR site, and the committed Hirwaun Power and Hirwaun Energy Centre sites have been modelled. These models have assumed a long-term basis, although the short-term discharge from the Green Frog STOR has been included as a pro-rated discharge over the course of the year. When combining the maximum predicted emissions reported by the model for the three other power plant sites with the maximum predicted emissions reported by modelling the Enviroparks facility as a stand-alone plant, the predicted environmental concentrations cannot necessarily be screened as insignificant. However, with the exception of the impact of Nitrogen Dioxide during one assessment, all remain within 70 % of the Environmental Quality Standard. This is despite the reduction in emissions of Oxides of Nitrogen from the Enviroparks site from the scheme already consented, and it is noted that this is almost certainly an exaggeration of the potential impact of the pollutants as, the dispersion of the plumes across the grid are such that concentrations of emissions from the additional sites are generally reduce at the point they impact the Enviroparks site and any down-wind receptors. Hence, combining the maximum predicted emissions from both models in order to estimate an overall maximum process contribution, will result in an over-estimate of the likely actual impact.

9.79 The modelling confirms that, although not all of the pollutants can be readily screened as insignificant, levels are sufficiently low to safeguard human health and the environment. With the exception of emissions during periods of abatement failure or when considering a worst case cumulative assessment, emissions of NO_x and NO_2, SO_2, PM_{10}, Volatile Organic Compounds and CO reduce with the proposed revised operations. Process contributions of Hydrogen Chloride and Fluoride are at a similar level to those reported in the 2008 ES, and emissions of all Metals and Dioxins increase slightly, although this is where they are proposed for discharge at up to the maximum levels allowed by national and international law. New pollutants have also been added to the discharges from the revised site operations proposed, including PAH, PCBs, and Ammonia.

9.80 A human health impact assessment has been prepared by GF Environmental to assess the risk to the health of people living and working in the vicinity of the Enviroparks facility. The assessment is presented as Appendix 9.7. Short term acute effects were for Nitrogen Dioxide, Sulphur Dioxide, and Particulate Matter as PM_{10} have been assessed in line with COMEAP procedures and suggest that increases in background pollutant concentrations at nearby residential properties will be low and will not have a significant impact on the health of people living and working nearby. Similar conclusions were drawn for other pollutants with short term, acute effects (HCl, HF and CO). The US EPA Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities has also been used, in order to assess the potential risk to health of people living and working in the vicinity of the Enviroparks facility due to emissions of dioxins and furans. The assessment indicates that the risk to health of the local population due to exposure to Dioxins in emissions from the Enviroparks facility is likely to be low, with exposure levels well below the Tolerable Daily Intake at nearby residential receptor locations.

9.81 Although not required as part of the initial Environmental Impact Assessment and Statement, subsequent revisions to the 'Environmental Impact Assessment Directive' (specifically Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment), indicates that consideration should be given to the impact of the project on climate, for example the nature and magnitude of greenhouse gas emissions. As such, this latest assessment provides consideration of the potential impacts of the scheme in relation to a 'do nothing' scenario. It is noted that unfortunately, the data sources used do not provide sufficient information for the consideration of the currently consented Enviroparks scheme which includes numerous treatment technologies for the incoming wastes. Therefore, this assessment has considered the greenhouse gas emissions which would be produced if all of non-recyclable wastes earmarked for Enviroparks continue to be sent to landfill, and those emissions which are likely to be produced when a combination of gasification and the landfilling of residues is applied to the non-recyclable fractions.

9.82 The greenhouse gas assessment has also only considered the emissions relating to the plant infrastructure and operations, including the process itself and the construction of the facility. Emissions related to the transport of waste to the site, ancillary offices, staff transport and amenity facilities have not been included, as it is considered that these will largely be the same for all of the scenarios modelled and will be insignificant in their quantities in comparison to the main processes. Additionally, although the recycling of the gasification residues will be undertaken and will therefore include a further positive environmental impact on the greenhouse gas emissions from the project, limited information has been available for collation in this study and hence, in order to present a conservative overall case, no assessment of these greenhouse gas savings has been included.

9.83 In 2006, the Environment Agency produced an assessment tool for comparing the life cycle impacts of waste management systems. This tool, WRATE, is now managed by Golder Associates. During its lifetime, there have been some concerns about how regularly the tool is updated. However, both England and Scotland also produce Carbon Metrics to provide a national carbon indicator for waste operations. It is noted that the two Metrics are not directly comparable. Available data for England[6] covers the period 2011 and 2012 and details the carbon savings made when managing wastes in ways other than landfilling. The Scottish Metric provides the CO_2 equivalent (CO_{2eq}) emissions per management method, and was updated in 2013[7]. The Scottish data was used by Eunomia in Spring 2015 to produce a Recycling Carbon Index for England, Wales and Northern Ireland Local Authorities[8]. Data from these two Metrics has been included and compared to provide both a liberal assessment of the Enviroparks project, and a more conservative assessment.

9.84 It is noted that this assessment of greenhouse gas emissions is presented by way of confirming the likely positive impact of the use of gasification over the landfilling of all non-recyclable materials from the Enviroparks project. It is recognised that the data included in the Carbon Metrics does have limitations, including:

- The English calculation is bound by the extent of the 'WasteDataFlows' data. For example, where material is sent directly to energy from waste, this effect, as well as any subsequent

effect from incinerator bottom ash which may be landfilled or recycled is included. However, where material goes to energy from waste as a reject from a materials recovery facility only the effects of the energy from waste process are counted, as 'WasteDataFlow' does not record the waste beyond being rejected to energy from waste.

- Additionally, the calculation could be considered to 'double count' material sent directly to energy from waste, as it takes that input tonnage into account in the energy recovery section, as well as then taking any landfilled incinerator bottom ash into the landfilled figure and any recycled incinerator bottom ash or metals into the recycling figure.

- For some of the carbon factors, the complex and varied waste and waste management routes are not reflected in the estimates.

- The Scottish figures include the impact from all waste produced in Scotland during a given year and the impact from managing this waste wherever this occurs. They include the carbon benefits from recycling (avoided production of virgin materials) and energy from waste (avoided fossil fuel generation) as well as the impacts from all waste management routes, however no further information on the detail included is available.

9.85 The background detail provided into the calculation of the carbon factors is insufficient to identify exactly where the Carbon Metrics use the same or different methodologies, and hence can only provide a high-level assessment. Table 9.11 details the breakdown of the materials arising at Enviroparks from the incoming 238,000 tonnes of waste.

Table 9.11: Materials Arising from Enviroparks Wales Limited

Material	Tonnage	Notes
Ferrous Metals	4,992	Assume like for like impact
Non-Ferrous Metals	1,190	Assume like for like impact
PVC	355	Assume like for like impact
Inert Landfill	39,174	Assume like for like impact
Landfill Residue	7,060	Assumed to go to landfill
Odd Waste	1,000	
Total	53,770	Tonnes diverted from gasification
Total for Gasification	184,230	Tonnes for gasification

9.86 Without the option of gasification, the amount of landfilled waste from an overall incoming tonnage of 238,000 tonnes would be 192,290 tonnes per year. Inert landfill has been considered to represent a recycling option and impacts are assumed to be comparable however much additional landfilling is applied. From the Carbon Metrics the following carbon emissions from waste management operations have been applied:

Table 9.12: Carbon Metrics Applied

Waste Considered	Kg CO2 / Tonne	
	Energy recovery	Landfill
Residual Waste – England (2011/2012)	- 37.05	289.84
Non-household (commercial and industrial, and construction and demolition) wastes; 'household type' and similar wastes - Scotland 2013	16	472

9.87 As the application of the two separate Metrics result in different greenhouse gas assessment results, both have been applied and provide a liberal and a conservative case assessment. The emissions calculated when applying the Scottish Metric are much greater individually, and suggest a positive contribution to greenhouse gas emissions from Enviroparks, whereas the English Metric calculates an overall greenhouse gas saving. That said, the Scottish Metric result in a larger saving of greenhouse gas emissions when comparing the Enviroparks proposal over landfilling. An assessment of the impact of the site construction has also been made, with carbon factors drawn from the materials use section of the 2016 UK Government greenhouse gas data for Company reporting[9]. Only the impacts of Phase II of construction have been considered, as Phase I has already been built, and there is no data currently available regarding the likely needs of any additional Phases. The use of Thermowood cladding has been considered, despite not being listed in the greenhouse gas data[9], with a carbon factor drawn from an assessment made by Satakunta University of Applied Sciences[10].

9.88 The greenhouse gas emissions applied to construction materials are presented in Table 9.13.

Table 9.13: Greenhouse Gas Emissions from the Construction of Phase II Enviroparks Wales Limited

Materials Use (T)	Tonnage (*)	Kg CO_{2eq} / Unit	Total Kg
Steel	750	4768.9	3,576,675
Rebar	650	4768.9	3,099,785
Steel Sheet	10	4768.9	47,689
Aluminium Sheet	25	4768.9	119,222.5
Insulation	90	1864.8	167,832
In-situ Concrete	27000	134.8	3,639,600
Concrete Block Paving	800	134.8	107,840
Concrete Pipes		134.8	0
Tarmac	250	39.2	9,800
Cedar Wall Clad (Thermowood m^3*)	20	204	9,831.33
Total Kg from Construction			10,778,274.83
Total Tonnes CO_{2eq} from Construction			10,778.275
CO_{2eq} per year (25-year lifespan assumed)			431.13

9.89 A summary of the calculated results of the overall assessment is presented below:

Table 9.14: Greenhouse Gas Emissions from the Construction and Operation of Phase II Enviroparks Wales Limited

	Conservative Assessment		Liberal Assessment	
Activity	Tonnes CO_{2eq} per year	Tonnes CO_{2eq} over 25 years	Tonnes CO_{2eq} per year	Tonnes CO_{2eq} over 25 years
Landfill Only	55,732.5	1,393,312	90,760.9	2,269,022
Gasification	-4,489	-112,226.3	6,751.9	168,797.7
Construction	10,778.3	10,778.3	10,778.3	10,778.3
Total Enviroparks	6,289	-101,448	17,530	179,576
Lifetime Savings (25 years) over Landfill Option	-	1,494,760	-	2,089,446

9.90 In summary, an assessment of the proposed construction and operation of the Enviroparks Wales Limited facility suggests greenhouse gas emissions savings across a 25-year lifetime of between approximately 1.5 million tonnes and 2 million tonnes when compared against landfilling operations. The significant differences in the assessment are a factor of the differences in the Carbon Metric data applied, and the considerations made in determining the carbon factors between the English and Scottish assessments. Additionally, unless included within the Metrics, no account has been made of the potential for the Enviroparks Wales Limited facility to recycle the ash which will be produced from the gasification process.

9.91 In reality, it is likely that the actual lifetime savings of greenhouse gases from the Enviroparks facility will fall somewhere between the conservative and liberal assessment results. However, what is clear is that, with the exception of the potential for the site to be constructed and to operate for a single year only, the use of the Enviroparks facility to gasify wastes which cannot be recycled will have a reduced greenhouse gas impact than if continuing to landfill all of the residual waste, and therefore the development will have a positive impact on air quality.

Traffic Emissions

9.92 In preparing the ES Addendum, the potential changes in proposed traffic levels and resultant emissions has been considered in chapter 8 and in a supporting Transport Statement. In summary, levels of operational traffic reduce substantially, largely due to the fact that the revised scheme will not accept waste from refuse collection vehicles, the local fleet of which would otherwise visit the site several times each day. Site staffing numbers also reduce, with a total staffing complement of 69, although up to 58 of those staff will travel to work each weekday, with reduced staffing over weekends. This compares to daily movements of up to 53 staff for the consented scheme. The Transport Statement notes that the original Transport Assessment (2008) calculated peak hour am and pm movements of 45 and 73 two way movements within the Industrial Estate. The peak hour pm movements are set to reduce by 13 under the revised scheme, and although the peak hour am increases by 2 vehicle movements, the impact of this is considered to be negligible.

9.93 Traffic movements during construction have been estimated based on the identified technology requirements, and likely staffing and labour figures. These have largely been provided by the Construction Advisers, Dawnus Construction. They result in a significant increase in the numbers proposed by the original scheme, and these may also coincide with other committed development construction periods. As such, although the operational vehicle movements have reduced and have not therefore been assessed further by the Transport Statement, the methodology applied by the Design Manual for Roads and Bridges (DMRB)[(11)] has been used to assess the likely impact of construction vehicles, whether alone or in combination with other committed developments, during the proposed construction phase (2017 – 2019).

9.94 Similarly to the 2008 assessment, the DMRB screening methodology concludes that the increase in pollutant concentrations for each year from the development construction traffic showed little change in all pollutant concentrations, with increases being consistently less than 1 µg m^{-3}. The largest increase was predicted at the petrol station on the A465 to the east, where the traffic from the construction of the Enviroparks site, the Abergorki Wind Farm and the Hirwaun Power facility in combination could result in an additional contribution to the background levels of Oxides of Nitrogen of 0.1 µg m^{-3} in 2018. This obviously assumes that each of the developments is indeed constructed at their proposed timescales, but still results in the impact of the proposed development traffic on the local air quality being considered to be insignificant.

MITIGATION

9.95 Details of the proposed mitigation measures to be employed by the Enviroparks site for the protection of air quality have been provided throughout this chapter, and are similar to those already included in the consented development. However, a summary of these proposals is provided here.

Construction

9.96 An Environmental Management Plan is proposed which will ensure that full consideration is given to the potential nuisance elements of construction such as the creation of noise, dust or odour. Measures will include:

- Frequent and regular observations of noise, odour and nuisance issues within and outside of the site boundary during construction activities;
- Early warnings to be given to neighbouring industries and residents, of activities which may cause a nuisance;
- Consideration of weather conditions prior to undertaking potentially dusty works, and the provision of suitable mitigation techniques such as damping down, or delaying works as necessary;
- Sheeting raw materials or stock piles as necessary to control dust emissions;
- The creation of hardcore and / or paved roadways around the site at the earliest opportunity;
- The creation of a transport plan which considers the safest and most direct routes across the site, safe site speed limits and the direction of delivery vehicles.

Operation

9.97 Mitigation for operational air quality impacts has been built into the design of the facility and comprises a combination of abatement systems such as:

- All operations which may have an impact on odour generation will be undertaken internally. This includes waste receipt, handling, treatment and waste and fuel storage;
- There will be no external feedstock storage;
- Enviroparks will undertake frequent and regular observations of odour at key locations to identify any processing or maintenance issues promptly. The Company EMS includes audit and reporting protocols;
- A dust and odour suppressing foam will be applied during the treatment of waste within the Fuel Preparation Hall.
- Ventilation from the Gasification Hall will be discharged at a high level.
- Ventilation air from the Fuel Storage Hall will serve as combustion air for the gasification processes, in order to abate any odorous emissions from this area.
- The three gasification lines will include abatement measures to control emissions of Oxides of Nitrogen, Sulphur Dioxide, Hydrogen Chloride, Heavy Metals, Dioxins, and Particulate Matter;
- Gasification lines will discharge through flues at an adequate height to promote effective dispersion;
- Good on-going management and housekeeping practices.

9.98 As a result of the inherent abatement and management systems proposed, it is not anticipated that any of the current air quality objectives or similar assessment levels will be jeopardised, and the potential for odour nuisance around the site and outside of the site boundary is limited. Therefore, no further mitigation measures are proposed.

EVALUATION OF RESIDUAL EFFECTS

9.99 An assessment has been undertaken to consider the effect that the proposed changes to the Enviroparks development will have on air quality. Consideration has been given to the likely regulated emissions from the site processes, as well as the potential for the generation of nuisance emissions such as odour and dust, and emissions from traffic generation. A worst-case scenario has been assumed where possible, and it has been considered unacceptable for the proposed development to suggest a breach of any current Environmental Quality Standard. The effects of the development can be assessed against the following significance matrix:

Table 9.15: Significance Matrix for the Assessment of Air Quality Impacts from the Revised Development Proposal

Positive or Negative	Significance	Description of Impact
Negative	High	Predicted environmental concentration* is 75 % of the assessment level or more and / or; A significant predicted increase in the potential for local nuisance.
Negative	Medium	Predicted environmental concentration* is 25-75 % of the assessment level and / or; A moderate predicted increase in the potential for local nuisance.
Negative	Low	Predicted environmental concentration* is 25 % of the assessment level or less and / or; A small predicted increase in the potential for local nuisance.
Either	Negligible	Predicted changes in the air quality are so slight that the effect is negligible with insignificant process contribution and / or; No change is predicted in the effect of any local nuisance issue.
Positive	Low	A small predicted decrease in the levels of pollution in the local air and / or; A small predicted improvement in a local nuisance issue.
Positive	Medium	A moderate decrease in the levels of pollution in the local air and / or; A moderate predicted improvement in a local nuisance issue.
Positive	High	A significant decrease in the levels of pollution in the local air and / or; A significant predicted improvement in a local nuisance issue.

** Where any predicted environmental concentration is not available, the assessment will apply the same consideration to the process contribution.*

9.100 During the construction of the site, full consideration will be given to the potential for the creation of dust emissions and their control through the use of an Environmental Management Plan. Although the potential for dust emissions does exist, comprehensive management and full consideration for the site neighbours should ensure that the impact from dust emissions during construction remains a **low negative risk**.

9.101 Once operational, the site has limited potential for the creation of dust emissions as materials handling is undertaken internally. Therefore, the potential impact from dust emissions once the site is operational is considered **negligible**.

9.102 The potential for emissions of odour from the site during construction is **negligible.**

9.103 Despite proposing to accept wastes for recycling and to provide a fuel for the creation of energy, which might be considered to be an inherently odorous operation, the nature of the incoming wastes which will not have a significant biogenic content, and the proposed control methods at the Enviroparks site which include containment, suppression, the use of potentially

odorous air from the fuel storage area as combustion air for the gasifiers, and good management and housekeeping measures, aim to provide a high level of control and abatement of potentially odorous emissions. As identified in the Company Odour Management Plan, potential failures of these normal control measures could occur, however in such an instance, further measures would be implemented to minimise the risk of increased nuisance from the site. As such, despite the potential significant risk of odour creation through the handling of wastes, the control measures proposed for the development should reduce the potential of odour from the site to one of **medium negative risk** and short term effect.

9.104 The dispersion modelling exercise applied information provided by the design engineers. The emissions data included are considered to represent worst case results as the model has been run to assume continuous discharge at the maximum emission limit values, all year round. Models have also been run to assess failure scenarios and cumulative effects. Incorporation of background pollutant concentration data takes into account other local sources of pollution where these are already in existence. The maximum ground level concentrations across a 5 km^2 grid have been reported, for five years-worth of meteorological conditions, as have the highest ground level concentrations predicted at local sensitive receptors.

9.106 The modelling exercise predicted no breaches of air quality objectives or assessment levels. When modelling a 45 m stack, the process contribution and predicted environmental concentrations of all pollutants remained below 70 %, with many process contributions being screened as insignificant. With the exception of emissions during periods of abatement failure or when considering a worst case cumulative assessment, emissions of NO_x and NO_2, SO_2, PM_{10}, Volatile Organic Compounds and CO reduce with the proposed revised operations. Process contributions of Hydrogen Chloride and Hydrogen Fluoride are at a similar level to those reported in the 2008 ES, and emissions of all Metals and Dioxins increase slightly, although this is where they are proposed to be discharged at up to the maximum levels allowed by national and international law. New pollutants have also been added to the discharges from the revised site operations proposed, including PAH, PCBs, and Ammonia.

9.107 Human Health Risk Assessments for Nitrogen Dioxide, Sulphur Dioxide, Particulate Matter as PM_{10} Hydrogen Chloride, Hydrogen Fluoride, Carbon Monoxide and Dioxins indicate that the risk to health of the local population due to exposure to emissions from the process is low. With some small increases in process contributions, and several decreases, but with air pollution remaining within the Environmental Quality Standards and having a low potential for health risks, it can be concluded that there is no change in the potential impact from the process from that already consented, and overall, the development continues to represent a **medium negative** potential impact on the local air quality.

9.108 An assessment of the likely greenhouse gas emissions from the construction and operation of the proposed facility against an alternative of landfilling for a 25-year period, results in a **high positive impact** from the development.

9.109 Emissions from the traffic movements created during the construction of the proposed development have been assessed using the DMRB modelling tool and suggest that the impact of the proposed development on current and predicted future concentrations of pollutants is **negligible**.

9.110 Consideration of any potential air quality impacts of the development, including a Habitats Regulation Assessment which will consider the impact of the emissions on the local Special Conservation Areas, will continue throughout the preparation of the Environmental Permit Application. This will ensure that all potential impacts are considered and suitably addressed.

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