

GF Energy Ltd

Timet Capacity Mechanism Development

Planning Statement



May 2015

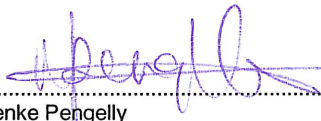
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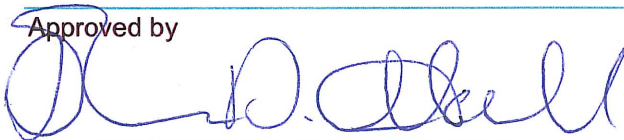
Report for

David Sheppard
G F Energy
17 The Courtyard
Gorsey Lane
Coleshill
Birmingham
B46 1JA

Main contributors

Chris Haigh
Thomas Jones
Gemma Mantle
Nienke Pengelly
Deborah Starkings

Issued by
.....
Nienke Pengelly

Approved by
.....
John Hall

Amec Foster Wheeler

Canon Court
Abbey Lawn
Abbey Foregate
Shrewsbury SY2 5DE
United Kingdom
Tel +44 (0) 1743 342 000

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1. Introduction

1.1 The Proposed Development

The proposed development is for a gas fuelled capacity mechanism embedded power plant at the Westfield Industrial Park at Timet near Swansea. The mechanism comprises a series of gas powered generators which operate on a short term basis to meet peak capacity in the electricity distribution network i.e. they are a supplementary form of power which provide back-up supplies during potential black-out periods or when demand outstrips supply.

The proposed development will install up to 37 gas fired spark ignition engines each with up to 1MW export electrical output. These engines offer a number of advantages over other combustion techniques for this type of application including short duration to full power output, high levels of availability, reliability, high generation efficiency and the possibility to match the electrical requirements with the number of operational engines.

This is hereafter referred to as the proposed development. Details of the capacity mechanism process and the physical development are set out below.

1.2 The Applicant

GF Energy Ltd (hereafter referred to as GFE) has a contract to supply electrical power via the recent capacity mechanism auction. These plants will operate on a short-term basis meeting peak capacity within the electrical distribution network. They are expected to operate for up to 1,200 hours per year, but when called by the National Grid, they have to reach maximum power output within 2 minutes and supply electricity for the duration of the call period.

1.3 Statutory Requirements

The application has been prepared in accordance with the provisions of the Town and Country Planning Act 1990 (as amended) and Town and Compulsory Purchase Act 2004.

As the proposal falls within Schedule 2 development under the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999* as amended (hereafter referred to as 'the EIA Regulations'), a Screening Opinion has been requested from Swansea Council under the procedures set out in Part II of the EIA Regulations.

The proposed development is considered to be of a nature and scale that would not result in any significant adverse environmental effects on the surrounding area. In this context, it is considered that the proposed development does not require the preparation of an Environmental Impact Assessment under the provisions of the EIA Regulations.

1.4 The Submission

The following plans and documents have been submitted alongside this planning statement:

Drawings

- ▶ Site Location Plan (Drawing Reference 230/02);
- ▶ Existing Site Layout Plan (Drawing Reference 230/003);
- ▶ Proposed Site Layout Plan (drawing Reference 230/004D);
- ▶ Transformer Elevations and Plan (Drawing Reference STD/010);



- ▶ Containerised Generator Elevations and Plan (Drawing Reference STD/011A);
- ▶ 33Kv Substation Elevations and Plan (Drawing Reference STD/012);
- ▶ Gas Governor Kiosk Elevations and Plan (Drawing Reference STD/013B);
- ▶ Switch Room Elevations (Drawing Reference STD/019);
- ▶ Welfare Office Elevations and Plan (Drawing Reference STD/021);
- ▶ Acoustic Fence (Drawing Reference STD/03); and
- ▶ Zenith Security Fencing information.

The above drawings and supporting figures are appended in Appendix A.

Documents

- ▶ Planning Application Forms (Appendix B);
- ▶ Air Quality Assessment (Appendix C);
- ▶
- ▶

2. Description of the Development

2.1 The site

The site is located to the north west of Swansea and comprises approximately (~) 0.57 hectares (ha) in area. The approximate national grid reference for the centre of the site is SS606963. A site location plan is attached (Drawing 230/02).

The land is currently poor quality agricultural land. It is set in a valley which slopes gently up to the north and south. The field within which the compound would be situated is bounded by mature trees and hedges. It is located to the south of an existing Western Power Distribution (WPD) sub-station and immediately to the west of an existing diesel powered Short Term Operating Reserve (STOR) generation plant. Open fields lie to the west and south, whilst a more wooded area lies to the north separating the site from the Afon Lian some 70 m away.

The site is accessed via the existing access road to the WPD substation from Titanium Road, which provides access on to the wider highways network at the A483 in Fforest-fach.

Two 33kV overhead lines currently cross the field in which the proposed development is situated. The western line will be retained and passes to the west of the site boundary whilst the eastern line which will be undergrounded by WPD and will pass under the site as part of a separate development project.

This undergrounding will be completed prior to commencement of the capacity mechanism construction and the easement is shown on Drawing 230/004D. No stand-off is required for this level of voltage and there would be no restriction on building over it.

The site and adjoining land is identified within the emerging Local Development Plan for the future extension of Westfield Industrial Park on the western side of Swansea.

2.2 The proposed scheme

The proposed development will comprise up to 37 gas fired spark ignition engines each with approximately 1MW export electrical output.

The development will be powered by natural gas which will be piped under the site access from a high pressure main located on Titanium Road. A gas governor and metering kiosk will be located at the site entrance and from here it would be piped underground to each of the generators.

The generators will be arranged in rows on the site and each would be encased in a white steel container, measuring approximately 12 m by 3 m. Each would be approximately 2.8 m high with 2.2 m roof mounted plant and a 5.5 m high stack situated on top of the generator cabin. The preferred generating unit is the Guascor SFGLD 560 engine rated at 762 kW electrical output, and capable of operating as a back-up unit in the event of a loss of power or to generate commercially exported power continuously. On average the plant will operate for around 5 hours per day at peak times, and around 1,200 hours per year (based on historical data and projections from DECC).

The proposed engines offer a number of advantages over other combustion techniques for this type of application including short duration to full power output, high levels of availability, reliability, high efficiency and the possibility to match the number of operational generators to demand.

19 transformers, each comprising a dark grey box with cooling fins on each corner measuring in total 1.8 m x 1.8 m x 2.2 m high (see Drawing STD/010) would be constructed – each serving two generators.

In addition the following structures are proposed on the site:

- ▶ Switch room – a metal cabin measuring 12 m x 3.2 m and 4 m high (to ridge) with two sets of double doors and a single door set into the front elevation to provide access. The cabin would be green in colour (see Drawing STD/019);

- ▶ Gas governor kiosk – measuring 6.15 m x 1.8 m and 2.25 m high (see Drawing STD/013B);
- ▶ 33Kv substation (see Drawing STD/012);
- ▶ Welfare office (see Drawing STD021); and
- ▶ Oil tanks.

The electricity generated will pass out through two small substations on the southern edge of the site and connect via cables under the access track to Titanium Road to a WPD substation 0.3 km to the south.

Highway access would be from the WPD sub-station service road via an existing field access immediately to the south of the existing generation compound from an existing field access as shown on Drawing 230/004D. This will be tarmacked and designed with a turning head within the site to allow vehicles to enter and leave the site in forward gear. A new gate to the south of the proposed access track will ensure continued access to the agricultural field.

The development will be enclosed within a 2.4 m high metal security fence with the appropriate signage to adhere to HSE regulations. Within this fence will be a 3.5 m high acoustic fenced compound.

This would be made from 50 cm high planks of acoustic cassettes comprising insulating material with black glass fibre protective tissue, fronted with a grey front panel made from 100% recycled cellular u-PVC with a perforated internal panel at the back, again made of 100% recycled cellular u-PVC and incorporates a 35 mm void space.

These panels sit on top of a concrete gravel board and are slotted into H-shaped fence posts which also include an acoustic seal. The acoustic barrier is expected to reduce noise from the site by 4dB below local background levels.

6 m high security columns with CCTV cameras will be provided each corner of the site. Additional security will be provided by a security company to ensure site and community safety is maintained. In addition, active detection methods will also be employed on the site which have been successfully used on the adjacent STOR site.

No permanent staff will be employed at the site but engineers will visit the site up to three times a week to check generators and undertake general maintenance. It is anticipated that once operational no more than two transit vans would be required on the site at any one time.

2.3 Scheme Construction

Site construction, laying of underground services and preparation of the foundations and slabs for the generators would take roughly three months with a further three to four months required for the delivery and installation of the generators. These would arrive on a lorry and be craned off into the appropriate location prior to connection to utilities.

3. The need for the development

3.1 Capacity mechanism

Capacity mechanism is a service administered and paid for by the National Grid that enables short term predicted shortfalls in electricity supply to be met – for example, as a result of sudden cold weather.

The grid experiences a large fluctuation of demand throughout the day and throughout different times of the year. During periods of high demand, the Grid will either reduce the demand, or increase supply, to maintain a 20% supply margin. Where unanticipated demand exceeds supply, National Grid can call on a number of short term supplies including pump storage and STOR generation plants but where a supply imbalance is identified in advance – such as weather conditions resulting in increased demand for heating or reduced supply or wind or solar energy or a power station comes off line for technical reasons, the distribution network can be supplemented by capacity mechanism generation.

When called upon, capacity generators can produce electricity very quickly reaching maximum output within 1 minute. The providers of capacity mechanism generation quickly begin to generate power and rebalance the system, providing a regular buffer within the electricity supply to ensure that demand can be met and reducing the likelihood of power cuts.

Capacity mechanism contracts with the Grid require operators to guarantee that their plant be available at specific times and days of the week, known as 'availability windows'. This means that the engines will not be running continuously. The availability windows vary by season and year-on-year and are not known more than a year or so in advance. For the current modelling, it was assumed that the facility would be used between the times of 07:00 and 21:00.

More flexibility is required in the electricity distribution system for the following reasons:

- ▶ The increased reliance on renewable energy and intermittent power sources, notably wind, which means that a larger portion of the overall capacity of the network is not certain. When the renewable energy is not available, this needs to be covered by an alternative form of supply.
- ▶ The proposed increase in size of the next generation of nuclear power plants from 1.2GW to 1.8GW each has a similar demand increase. In the event of one of these new generating stations coming off line, a larger amount of power is lost that must be covered by an alternative form of supply.
- ▶ There is also a large interim demand to be covered as many of the existing coal and nuclear power plants are due to come off line in the next decade before the full benefits of the renewables have time to be developed. Government figures included in the Energy White Paper - Meeting the Energy Challenge state that a total of 22.5 GW of generating capacity will be gone by 2020. By 2025 there will be further coal plant closures and just one of our existing nuclear power stations will still be working. This represents almost 50% of existing capacity.

3.2 The suitability of this site

This site offers a number of advantages for this kind of this development.

When electricity is generated in this way, it is done so at Low Voltage, typically 415V and then increased in voltage to allow for efficient transmission through the network. This 'stepping up' is done through transformers situated in substations.

In consultation with WPD engineers and their asset management teams, GFE has analysed the WPD networks and visited all of the 500+ primary substations on the network to identify sites which can accept embedded generation. Fewer than 40 potential sites have been identified which operate at a voltage which is capable of accepting generation connections at 40MW and have no other technical issues.



The site at Timet is one of the few identified locations and has sufficient fault level headroom and connectivity to accept generation.

It is also in an area identified for future industrial development where its containers and stacks are more likely to conform to future uses. The site is also over 500 m from residential receptors which might be affected by noise or air quality issues.

4. Operational and Environmental Safeguards

4.1 Air Quality

An air quality assessment of the site based upon a detailed dispersion model has been undertaken by Amec Foster Wheeler and forms part of this application. The full assessment is appended at Appendix C. The pollutants covered by the assessment are oxides of nitrogen (NO_x as NO₂); and carbon monoxide (CO).

The assessment assumes the engines operate for full, hourly periods to predict both the long-term and short-term impacts of engine emissions and concentrations were calculated for each hourly period during the typical availability windows. This approach ensures that those meteorological conditions conducive to producing elevated ground level concentrations of pollutants are appropriately considered. However, given that the engines will only run for about 5 hours a day and about 1,200 hours per year, additional post-processing of raw modelled output has also been undertaken.

The impact assessment demonstrates that, under the anticipated operational profile of the plant, exceedances of any AQS, EAL, critical level or critical load are unlikely, or where exceedances are predicted due to the existing baseline concentration or deposition rate, the additional contribution from the plant is not considered to be significant. In addition, the impacts at human receptor locations can be defined as 'negligible' following the guidance issued by Environmental Protection UK.

On this basis, air quality factors should not be considered a constraint to development of proposal.

4.2 Ecology

An ecological assessment of the site has been undertaken by Amec Foster Wheeler and forms part of this application. The full assessment is appended at Appendix D.

The appraisal finds that the site comprises a species-poor agricultural field in silage production with very limited potential to support protected or notable species and is of very low biodiversity value.

Adjacent habitats are more species-diverse and comprise marshy grassland, scrub, woodland and hedgerows with potential to support reptiles and bats, and which form part of Penyfodau Fawr to Llewitha SINC. Further SINCS occur within 1 km of the proposed development and all have been designated for habitat mosaics of rush pasture, scrub, woodland and meadows.

Whilst there could be potential effects on the Penyfodau Fawr to Llewitha SINC these potentially negative effects would be avoided / minimised through the adoption of various environmental measures to minimise the working footprint and disturbance arising from construction. These measures are set out in Table 5.1 of the ecological assessment and would also ensure legal compliance.

On this basis, ecological factors should not be considered a constraint to development of proposal.

4.3 Noise

A BS 4142 acoustic assessment of the site has been undertaken by Clover Associates and forms part of this application. The full assessment is appended at Appendix E.

This assessment has been carried out at the nearest receivers to a proposed gas fuelled power plant and a background noise survey was conducted during Thursday 30th April 2015 and Friday 1st May 2015 at a location representative of the nearest sensitive receivers.

The assessment has shown that the proposed installation would predict a noise rating level of 4dB below the local background. According to BS4142 is indicative that the proposal will have a low impact.

On this basis, noise should not be considered a constraint to development of proposal.

5. Policy Appraisal

5.1 Introduction

This section considers the planning policies and legislative framework against which this proposal will be considered. It identifies relevant policies set out in the Development Plan and also those national and local policies and statements which are considered to be material to the consideration of the Application.

5.2 National Policy

Planning Policy Wales (July 2014)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It notes the requirement for every local planning authority in Wales to prepare a local development plan (LDP) for its area which should provide a firm basis for rational and consistent decisions on planning applications and appeals.

It requires applications for planning permission, to be determined in accordance with the approved or adopted development plan for the area, unless material considerations indicate otherwise (paragraph 3.1) and sets out a presumption of sustainable development which includes:

- ▶ Sustainable resource
- ▶ Sustaining the environment
- ▶ A sustainable economy
- ▶ A sustainable society
- ▶ The well-being of Wales

PPW places great emphasis on climate change and moving towards a sustainable, low-carbon economy. The proposal for gas-powered capacity mechanisms does not conflict with this as it provides short term additional capacity to support the network whilst that transition takes place and to support intermittent power sources such as wind. It will also meet the short to medium term demands as many of the existing coal and nuclear power plants are due to be retired in the next decade before the full benefits of the renewables have time to be developed.

PPW notes that development in the countryside should be located within and adjoining those settlements where it can be best be accommodated in terms of infrastructure, access and habitat and landscape conservation (paragraph 4.7.8) and efficient use of resources and land (paragraph 4.11.5). The application site immediately adjoins an existing STOR facility and is within an area identified for employment/industrial development in the Waunarlwydd-Fforestach Strategic Development Area - Concept Plan produced by developer Persimmon Homes in partnership with the Council in August 2014.

Applications that reflect the key principles of climate responsive developments and exceed the standards set out in Building Regulations are encouraged in PPW (paragraph 4.12.6). They should also ensure that development does not increase the risk of flooding elsewhere by loss of flood storage or flood flow route or increase the problem of surface water run-off (paragraph 13.4.2).

The application is accompanied by a drainage strategy which demonstrates that the site will neither be affected by flooding or cause flooding elsewhere.

PPW notes that adequate and efficient infrastructure, including provision of electricity is crucial for the economic, social and environmental sustainability of all parts of Wales (paragraph 12.1.1). It also considers that local planning authorities should seek to maximise the use of existing infrastructure and should consider how the provision of different types of infrastructure can be co-ordinated (paragraph 12.1.6). This application maximises use of the existing high pressure gas main and the only available grid connection.

The Welsh Government is committed to using the planning system to:

- ▶ Optimise renewable energy generation;
- ▶ Optimise low carbon energy generation;
- ▶ Facilitate combined heat and power systems (and combined cooling, heat and power) where feasible; and
- ▶ Recognise that the benefits of renewable energy are part of the overall commitment to tackle climate change by reducing greenhouse gas emissions as well as increasing energy security (paragraph 12.8.8).

Whilst the capacity mechanism proposal is not a renewable energy installation, it facilitates an increase in renewable and low carbon energy generation and is an important element of the wider context for reducing greenhouse gas emissions. Essentially, it provides the backup power generation to cope with peaks and troughs in the supply/demand cycle that are typical of renewable power sources and form part of ensuring resilience in supply as traditional coal and oil fired power stations are phased out.

5.3 Energy Statements

A Low Carbon Revolution - The Welsh Assembly Government Energy Policy Statement

This document opens with the statement “Climate change is the greatest environmental, economic and social challenge facing the planet.” The policy statement which follows sets out the Welsh Assembly’s ambitions for low carbon energy in Wales. Its ambition is to:

- ▶ Maximise energy savings and energy efficiency in order to make producing the majority of the energy we need from low carbon sources more feasible and less costly;
- ▶ Meet energy needs securely from low carbon sources; and
- ▶ Ensure that the transition to low carbon maximises the economic renewal opportunities for practical jobs and skills, strengthens and engages the Welsh research and development sectors, promotes personal and community engagement and helps to tackle deprivation and improve quality of life.

National Policy Statement for Energy (EN-1)

The NPS sets out the Government’s policy for delivery of major energy infrastructure over a certain threshold defined in part 3 of The Planning Act 2008. These include electricity generating stations generating more than 50 megawatts (MW) onshore from any fuel source. This scheme has a generation capacity of 40MW and is therefore below the threshold to require a Development Consent Order. However, the NPS sets out some useful general guidance on applications for schemes which provide additional generation capacity.

NPS-1 notes that demand for electricity is forecast to increase significantly over the coming decades to supply new homes, businesses and transport as well as increases in the use of electricity in existing premises. This will result in the need for additional generation capacity and distribution networks. In paragraph 3.7.3, the NPS notes:

“...that new electricity network infrastructure projects, which will add to the reliability of the national energy supply, provide crucial national benefits, which are shared by all users of the system.”

The creation of a capacity mechanism scheme at Timet entirely meets this requirement by providing short term supply to meet any shortage in local supply caused by either a peak in demand or a drop in supply.

5.4 The Development Plan

A new plan, the Swansea Local Development Plan (LDP), is being prepared and a preferred Strategy Final Draft was published in July 2014. It is a strategic level planning document that sets out the broad approach

the Council will take to ensure the City and County of Swansea (the County) is developed in a sustainable manner over the period to 2025. The preferred strategy outlined in this document would also promote the Westfield Industrial Park as a key development opportunity. The plan notes that *“the area fulfils an important role as a strategic employment location with a number of valued businesses, and these should continue to be supported during the LDP period”*. Development of the capacity mechanism site would therefore be consistent with the general emerging strategy proposed for the area.

The current development plan for the area is the City and County of Swansea Unitary Development Plan (2008). This is used to determine planning applications. The relevant policies are set out in Table 5.1 below and an assessment of the scheme against each policy is included.

Table 5.1 Assessment of Scheme against City and County of Swansea Unitary Development Plan Policy

UDP Policy	Assessment against Policy
EV1 General Development Principles New development shall accord with the following objectives of good design: - Be appropriate to its local context in terms of scale, height, massing, elevational treatment, materials and detailing, layout, form, mix and density, - Integrate effectively with adjacent spaces and the public realm to create good quality townscape, - Not result in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, disturbance and traffic movements, - Incorporate a good standard of landscape design, - Sensitively relate to existing development patterns and seek to protect natural heritage and the historic and cultural environment, not only on-site, but in terms of potential impact on neighbouring areas of importance, and, where appropriate: - Foster 'inclusive design' by ensuring the development allows access for the widest range of people possible, - Support an integrated transport system, - Contribute to the creation of new, and the improvement of existing, spaces and an enhancement of the general street scene, - Promote resource efficient and adaptable buildings and layouts using sustainable design and construction techniques, including the reuse and recycling of construction and demolition waste on site, and energy and water efficiency measures, - Provide a safe environment by addressing issues of security, crime prevention, and the fear of crime in the design of buildings and the space and routes around them Have regard to the desirability of preserving the setting of any listed building - Have regard to the desirability of preserving the setting of any listed building Design statements will be required in support of planning applications that have design implications, including applications for new or extended buildings and infrastructure, changes to landscape appearance, and/or those involving sensitive sites and locations.	The proposed scheme is within an area identified for industrial development in the emerging LDP. The location and minimal traffic movements will not result in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, disturbance and traffic movements. The site will be designed to be visually consistent with the neighbouring site. Security measures outlined above will address issues of security and crime prevention. Design statements are not required for engineering operations.
EV2 Siting & Location The siting of new development should give preference to the use of previously developed land over greenfield sites, and must have regard to the physical character and topography of the site and its surroundings by: - Avoiding locations that would have a significant adverse impact on prominent buildings, landscapes, open spaces and the general locality, including loss of visual amenity, - Effectively integrating with the landscape, seascape or coastline by utilising topography to integrate into the contours of the site and avoiding conspicuous locations on prominent skylines and ridges, - Retaining important views into and out of the site, - Taking into account and where possible retaining site features including existing buildings, topography, landscape, archaeological and water features, trees and hedgerows, and, where appropriate: - Undertaking, at the earliest opportunity, an assessment of species and habitats on site and, where planning permission is granted, implementing any necessary mitigation measures, - Avoiding detrimental effects on the historic environment, - Locating near transport nodes to encourage an integrated transport system,	The development is constrained by the need for good and proximate access to a viable sub-station. The site is adjacent to a STOR plant and within an area allocated for future industrial developments. The surrounding landscape features mean that from most views the development would be screened by existing, mature vegetation. An assessment of species and habitats on site accompanies this application. There are no known heritage assets which could be affected by this development. Access to the remaining agricultural land would be retained in perpetuity. The location of the proposed development reduces the potential adverse effects on nearby sensitive receptors.

UDP Policy

Assessment against Policy

- viii. Not prejudicing the viability and function of any agricultural land adjoining the site,
- ix. Determining whether the proposal would be at risk from flooding, increase flood risk off-site, or create additional water run-off,
- x. Having due regard to the implications of the development for infrastructure and services,
- xi. Integrating with existing community facilities,
- xii. Utilising landscape and topography to maximise energy efficiency,
- xiii. Having full regard to existing adjacent developments and the possible impact of environmental pollution from those developments, as well as the creation of any environmental pollution to the detriment of neighbouring occupiers (including light, air and noise),
- xiv. Identifying the location of any hazardous installations in the area and development that would be at risk from, or prejudice the operational use of, hazardous installations,
- xv. Identifying and fully addressing issues of contamination and land instability

EV6 Ancient Monuments and Protection of Archaeological Sites

The Council will seek to protect, preserve and enhance Scheduled Ancient Monuments and their settings, and also unscheduled archaeological sites and monuments and their settings listed in the County Sites and Monuments Record held by the Glamorgan Gwent Archaeological Trust's Curatorial Division. Where proposals affect sites and areas of archaeological potential, applicants will be required to provide the following information with planning applications:

- i. An assessment or evaluation of the archaeological or historic importance of the site or structure,
- ii. The likely impact of development on the archaeological site, and
- iii. The measures proposed to preserve, enhance and record features of archaeological interest.

There are no known sites or features of archaeological importance which would be affected by the scheme.

EV23 Green Wedges

Green wedges are identified at a number of locations including Cockett Valley (including Cockett and Hendrefoilan Ridges and land between Dunvant, Three Crosses and Gowerton),

Within these areas development will only be permitted if it maintains the openness and character of the green wedge and does not contribute to the coalescence of settlements or adversely affect the setting of the urban area.

Appropriate development within the green wedge comprises the following:

- Justified development in association with agriculture or forestry,
- Essential facilities for outdoor sport and recreation or cemetery use,
- Limited extension, alteration or replacement of existing dwellings,
- Small scale farm diversification,
- The re-use of existing permanent/substantial buildings,
- Affordable housing for local needs under Policy EV18,
- Other uses of land and forms of development that maintain the openness of the green wedge and do not conflict with the purpose of including land within it. (

The proposed development sits within the designated employment site, close to the green wedge between Waunarlwydd and Swansea Road to the north. The green wedge policy does not therefore affect the proposed development.

EV25 European Protected Sites

Development, alone or in combination with other plans or projects, which is likely to adversely affect the integrity of a European protected site (SAC, Marine SAC, SPA and Ramsar Sites) and is not directly connected with or necessary to the management of the site, will not be permitted unless:

- i. There are imperative reasons of over-riding public interest, including those of a social or economic nature, which are sufficient to override the reasons for designation, and
- ii. There is no alternative solution.

Where such development is permitted, planning conditions and/or obligations will be used to secure all compensatory measures necessary to ensure that the overall coherence of the European Site is protected.

Burry Inlet and Loughor Estuary 3 km to the west of the site is both an SPA and a Ramsar site and forms part of Carmarthen Bay and Estuaries SAC. The proposed development would have no direct effects on the designated site. The air quality assessment demonstrates how any emissions from the generators would not adversely affect this important site. The site would be designed to ensure there could be no risk of run-off of oils or other fuels or materials from the site into the Afon Lian which flows into the estuary at Loughor. This will ensure that the overall coherence of the European Site is protected and the proposal confirms with this policy.

EV27 SSSIs and National Nature Reserves

Development that significantly adversely affects the special interests of sites designated as SSSIs and NNRs will not be permitted unless the need for the development is of such significance that it outweighs the national importance of the designation.

The nearest SSSI, Burry Inlet and Loughor Estuary SSSI is approximately 3 km to the west of the site. It forms part of Carmarthen Bay and Estuaries SAC, Burry Inlet SPA, Burry Inlet Ramsar). As noted above, the proposed development will not have any

UDP Policy**Assessment against Policy**

Where development is permitted, planning conditions and/or obligations will be used to protect and enhance those interests and where necessary provide effective mitigation and compensatory measures.

adverse effect on the SSSI and is thus considered to comply with this policy.

EV30 Trees, Woodland and Hedgerow Protection

Protection and improved management of woodlands, trees and hedgerows which are important for their visual amenity, historic environment, natural heritage, and/or recreation value will be encouraged, with priority being given to:

- i. Protecting the remaining areas of ancient semi natural woodland and planted ancient woodland sites,
- ii. Promoting new planting with species appropriate to the location, where there is no conflict with other land uses or nature conservation interests, and
- iii. Ensuring that where management involves commercial felling and replanting, protection of amenity interests is achieved

No trees would be affected as a result of the construction of this proposed development.

EV34 Protection of Controlled Waters

Development proposals that may impact upon the water environment will only be permitted where it can be demonstrated that they would not pose a significant risk to the quality and or quantity of controlled waters.

Initiatives that lead to improvements in the quality of surface water will be approved subject to satisfactory ecological and visual safeguards.

EV35 Protection of Controlled Waters

Development that would have an adverse impact on the water environment due to:

- i. Additional surface water run off leading to a significant risk of flooding on site or an increase in flood risk elsewhere, and/or
- ii. A reduction in the quality of surface water run-off, will only be permitted where it can be demonstrated that appropriate alleviating measures can be implemented.

Sustainable drainage systems (SUDS) will be encouraged wherever they would be effective and practicable, so as to ensure that development does not increase run off, and potentially damage important landscape features and protected species and habitats. Where SUDS are not provided then any conventional drainage system utilised must improve the status quo.

The generators will be gas powered. There will be little opportunity to affect controlled waters. The only liquid on site will be lubricating oil. This will be stored in a bunded tank as well as on a bunded slab. The generator cabins are also bunded to prevent escape of the fluid when undertaking periodic oil changes in the generators. This will ensure there is no risk to controlled waters.

EV40 Air, Noise and Light Pollution

Development proposals will not be permitted that would cause or result in significant harm to health, local amenity, natural heritage, the historic environment or landscape character because of significant levels of air, noise or light pollution.

The emissions to air from this proposal are assessed in the Air Quality Assessment report submitted with this planning application (Appendix C). The assessment considers sensitive ecological receptors and human receptors. The report confirms the nutrient nitrogen and deposition rates at ecological receptors resulting from emissions from the installation are not expected to have a significant impact on the integrity of the designated ecological features of the sites and the impacts at human receptor locations can be defined as 'negligible'. Acoustic barriers will limit noise outputs from each generator unit to 75dB(A) at 1 metre. No lighting is proposed at the site which would be visible from outside the compound.

EC1 General Employment Sites

Employment land is allocated at the following locations to meet the growth needs of the local economy:

EC1 (4) Swansea West Industrial Park

"It is anticipated that the Industrial Park will be fully developed in the short term. Accordingly, land between Alcoa/Timet and the Industrial Park, south of the Afon Lian is allocated for B1, B2, and B8 uses to meet Swansea's economic growth needs".

The proposed development is within EC1(4), Swansea West Industrial Park. The proposed development is entirely appropriate for an industrial area and does not conflict with other potential developments within the allocation.

6. Conclusion

The capacity mechanism strategy is one which is designed to ensure continuity of electricity supply within the local distribution network. This network is essential for supplying homes and businesses with electricity.

There are a limited number of locations where such sites can be developed due to the current demands and opportunities of the distribution network. The site at Waunarllydd offers such a location.

Site design, vehicle movements and negligible environmental impacts mean that the development is in accordance with UDP Policy EV1 and EV2.

There are no known sites or features of archaeological importance which would be affected by the scheme and therefore the scheme is in accordance with UDP Policy EV6.

The proposed development would have no direct effects on the Bury Inlet and Loughor Estuary SPA, Ramsar, and SSSI and would be designed to ensure there could be no risk of run-offs of oils or other fuels or materials from the site into the Afon Lian which flows into the estuary at Loughor. As such, the scheme is in accordance with UDP Policies EV25 and EV27.

The accompanying air quality, ecology, and noise assessments have demonstrated that the proposed development will not have any significant effects on sensitive environmental and human receptors. As such, the scheme is in accordance with UDP Policy EV40.

Site design incorporating mitigation measures including bunding to ensure there is no risk to controlled waters mean that the development is in accordance with UDP Policy EV34.

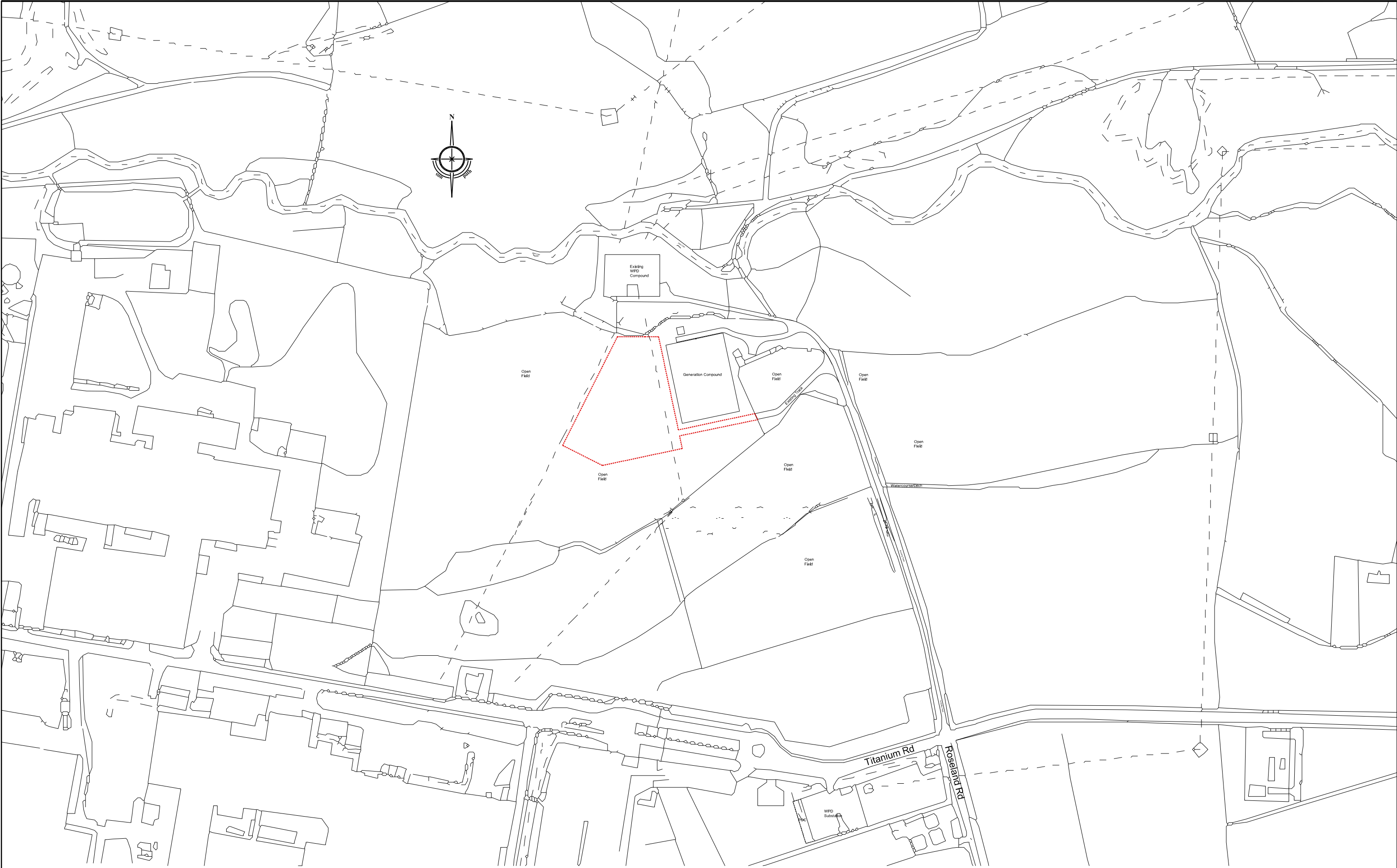
The site is allocated for employment development which is consistent with the proposed use. The proposed scheme is therefore in accordance with UDP Policy EC1.

Overall the scheme delivers a number of benefits, particularly ensuring local electricity supply. The site has been selected to minimise effects on sensitive environmental receptors and where necessary mitigation measures have been included in the scheme design to minimise off-site effects. These include acoustic fencing and bunding of fuel tanks. The scheme is considered to be in accordance with the relevant UDP policies and also with the strategy set out in the emerging Swansea Development Plan.



Appendix A

Supporting Figures and Drawings



GF Energy Ltd, 17 The Courtyard,
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Tender

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Project Title:

Generation Compound
Titanium Road
Swansea
SA45 4SF

Drawing Title:

Location Plan

Scale: 1:2500 @ A3

Date: March 2015

Drawing No:

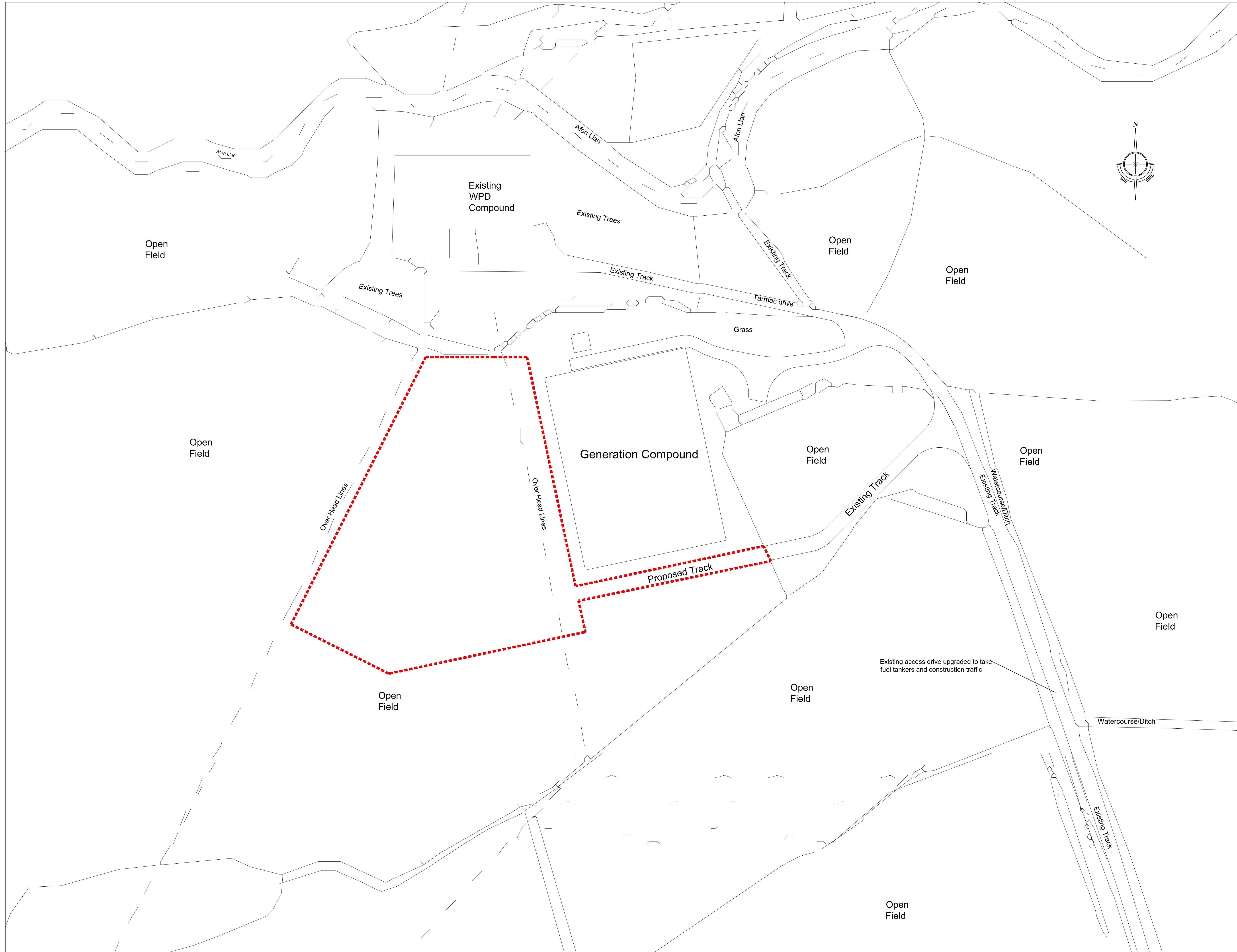
230/02

Plot date: 19-Mar-15

Drawn: SI

Checked: DS

ev:



Scale
0 5 10 15 20(m)

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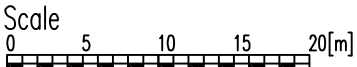
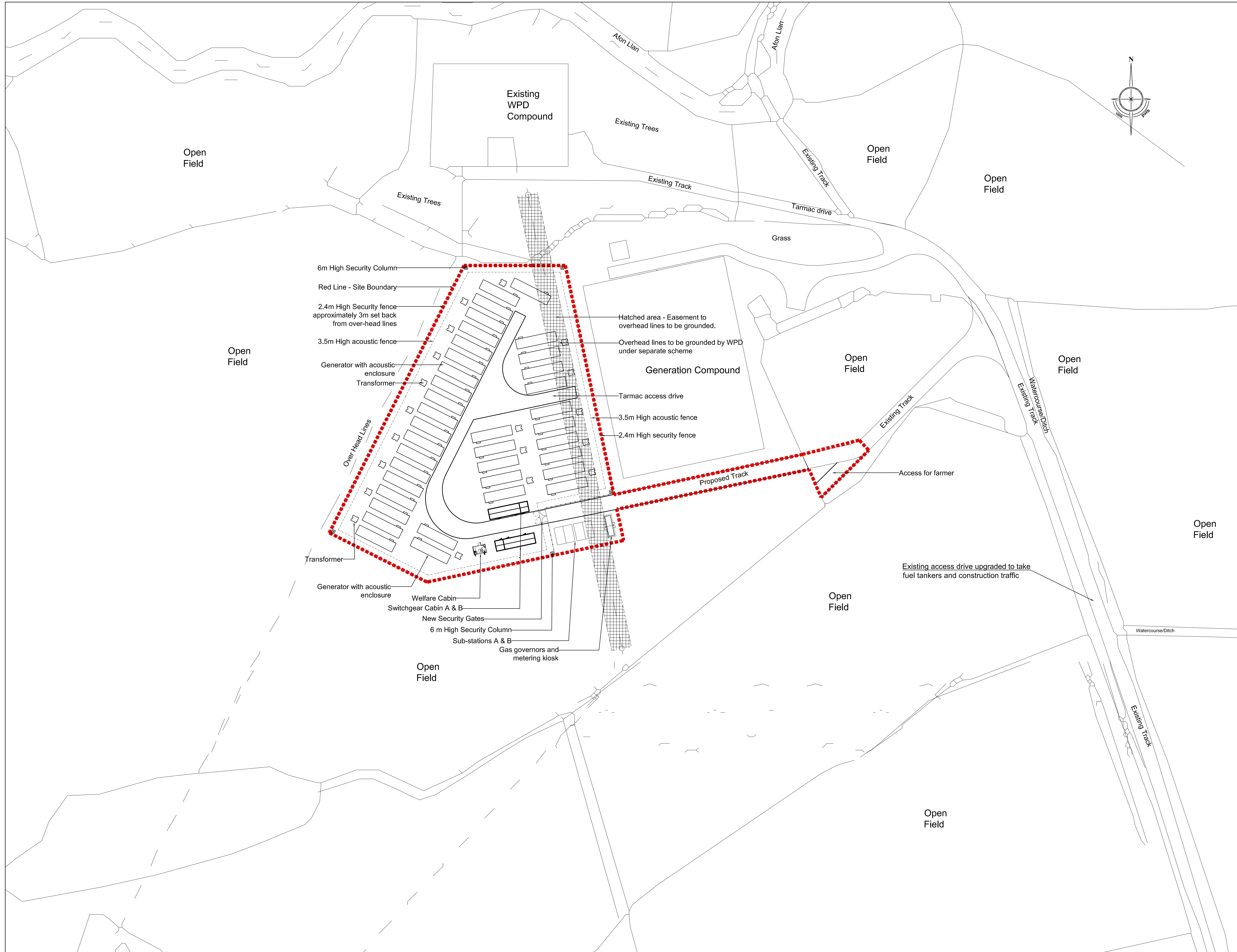
Project Title:
Generation Compound
Titanium Road
Swansea
SA5 4SF

Drawing Title:
Existing Plan

Scale: 1:500 @ A1 Date: March 2015
Drawn: SJ Checked: DS
Drawing No: Rev:

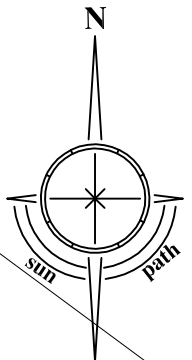
230/003

Plot date: 19-Mar-15



REVISIONS

Rev.		Date	By
A	Easement wording amended and farmer access indicated	08.04.15	DMS
B	Additional substation and switchgear cabin indicated	13.04.15	DMS
C	Gas governors and metering kiosk size amended,	21.04.15	SI
D	Generators orientation rotated 180°	24.04.15	SI



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Project Title:
Generation Compound
Titanium Road
Swansea
SA5 4SF

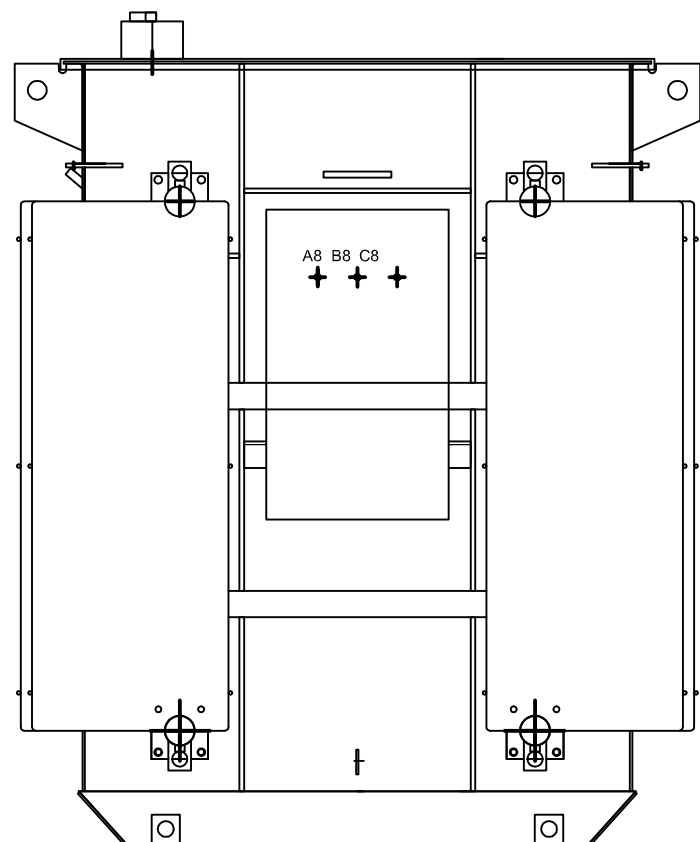
Drawing Title:
Proposed Plan

Scale: 1:500 @ A1 Date: March 2015
Drawn: SI Checked: DS
Drawing No: Rev:

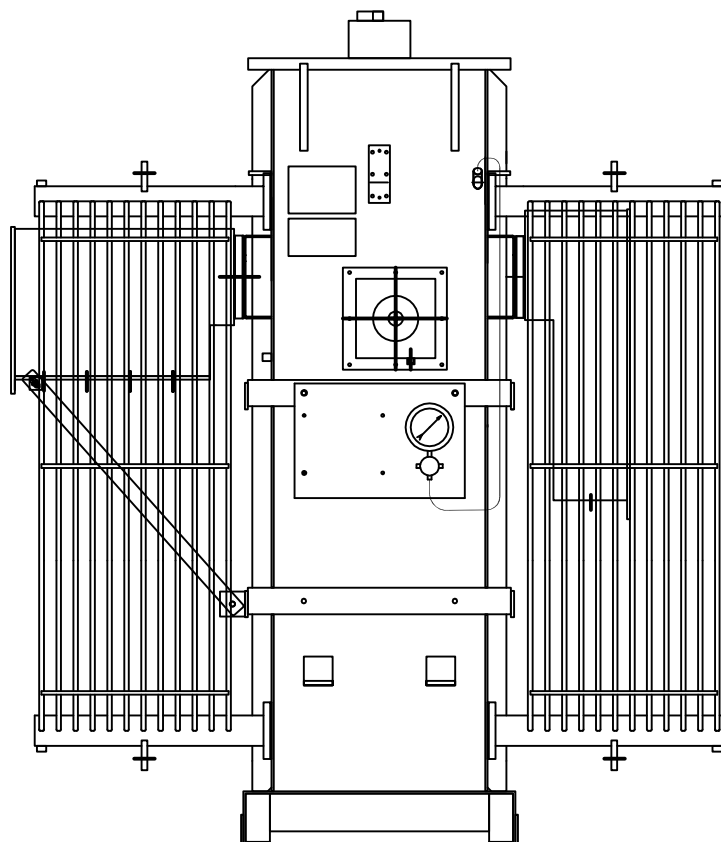
230/004

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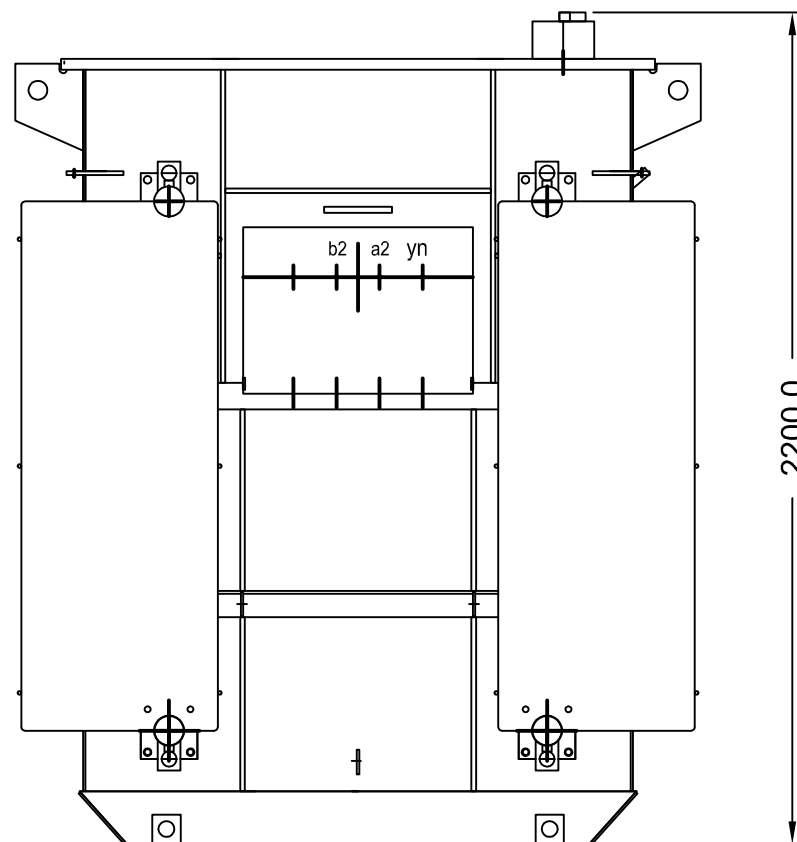
Plot date: 24-Apr-15



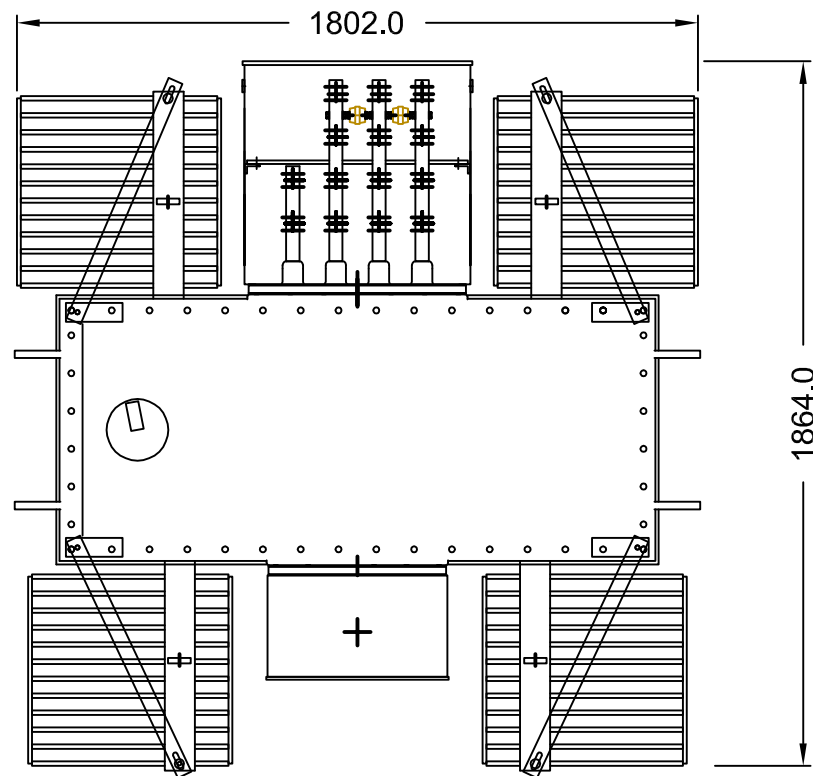
ELEVATION



ELEVATION



ELEVATION



PLAN

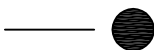
PAINT FINISH:
TO LTSC 1a - TO BS 381C COLOUR REF.632
DARK ADMILITARY GREY



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Project Title:

STANDARD DETAIL

Drawing Title:

Transformer

Scale: 1:20 @ A3

Date: Dec 2014

Drawing No:

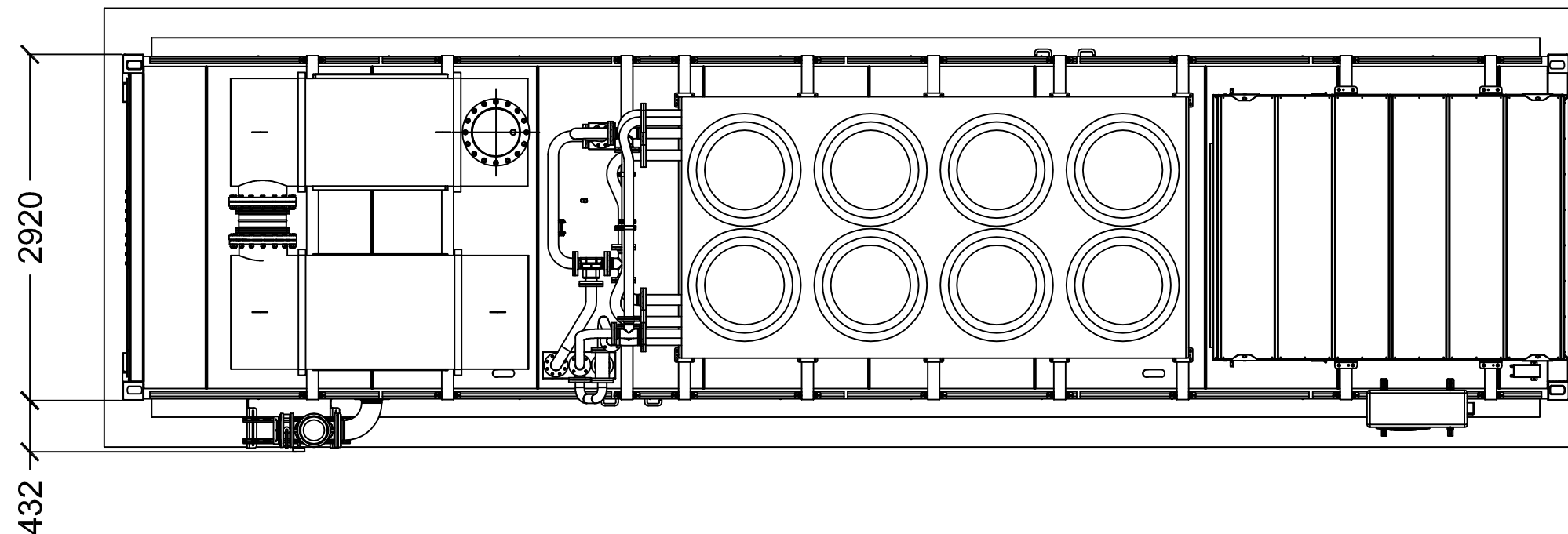
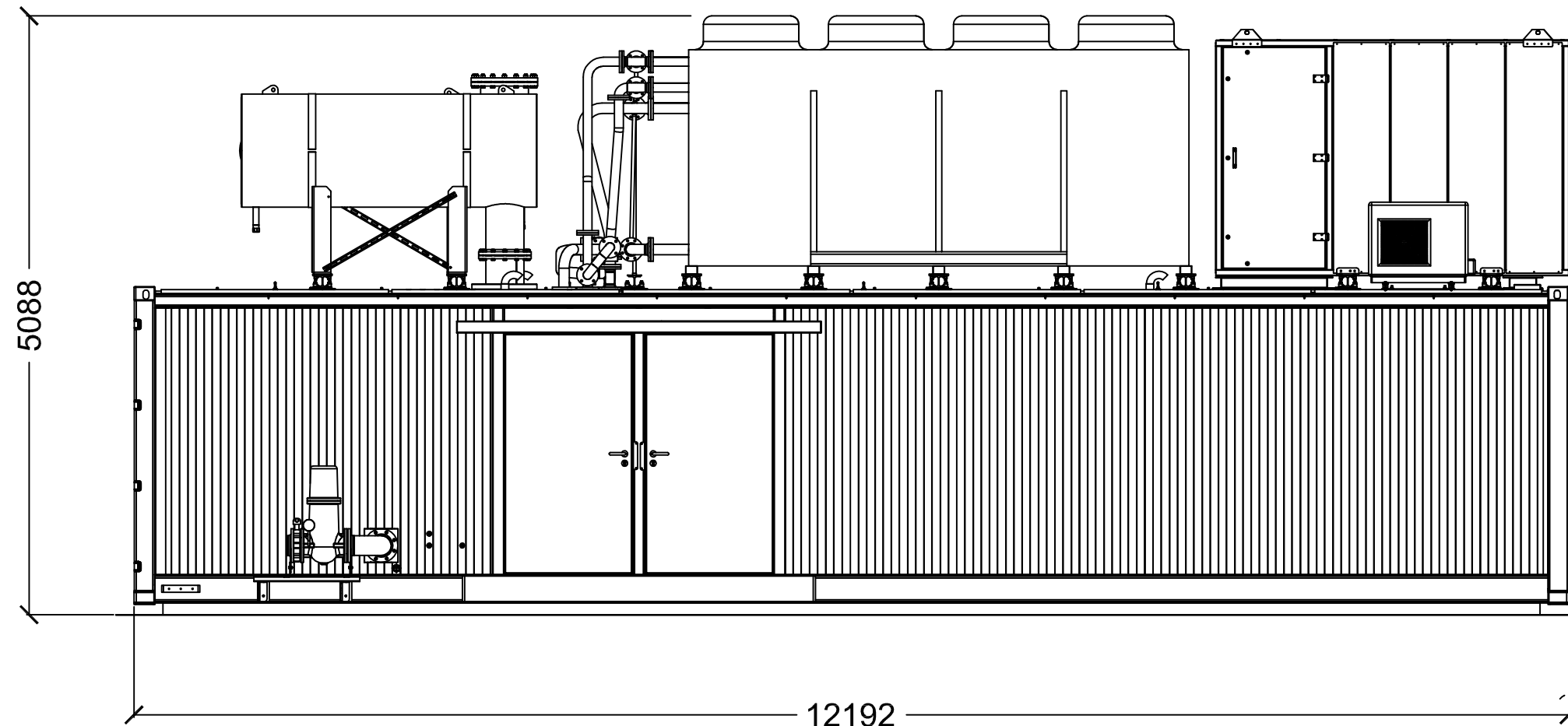
STD/010

Plot date: 23-Feb-15

Drawn: DMS

Checked:

Rev:



NOTES:
Noise Level - 75 dBa @ 1m (Freefield)

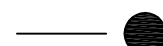
COLOUR:
External - White



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Rev.
A · Manufacturers layout revision

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Date. By.
26-2-15 LJN

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Project Title:
STANDARD DETAIL

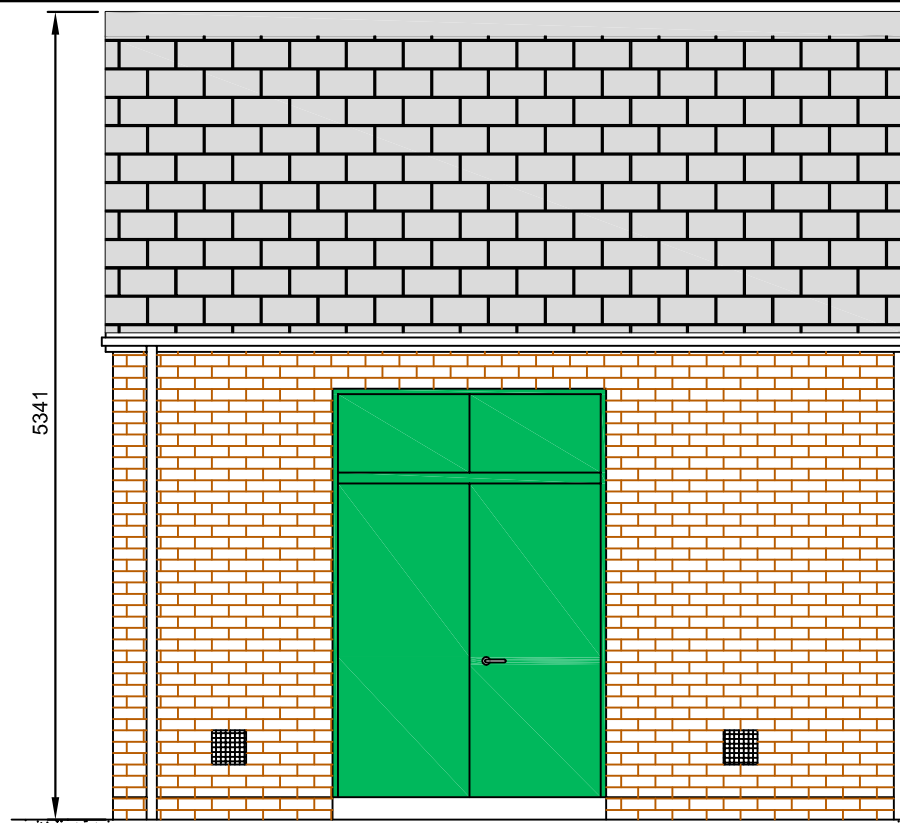
Drawing Title:
Containerised Generator

Scale: 1:50 @ A3 Drawn: LJN
Date: Dec 2014 Checked:

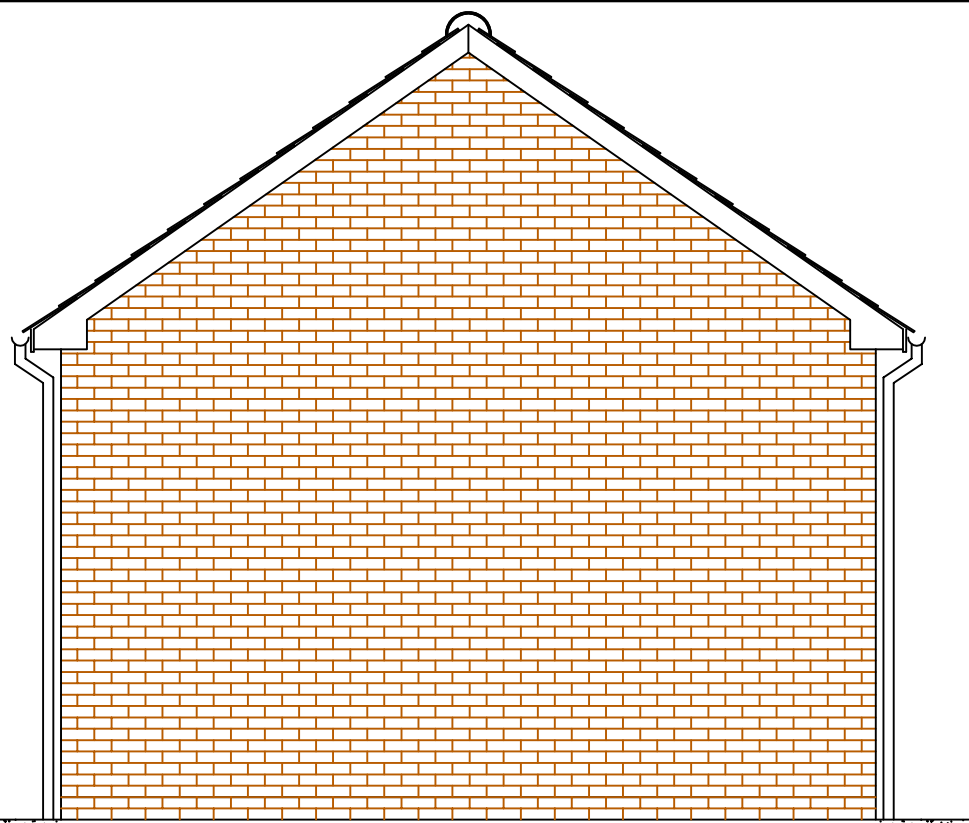
Drawing No: Rev:

STD/011 **A**

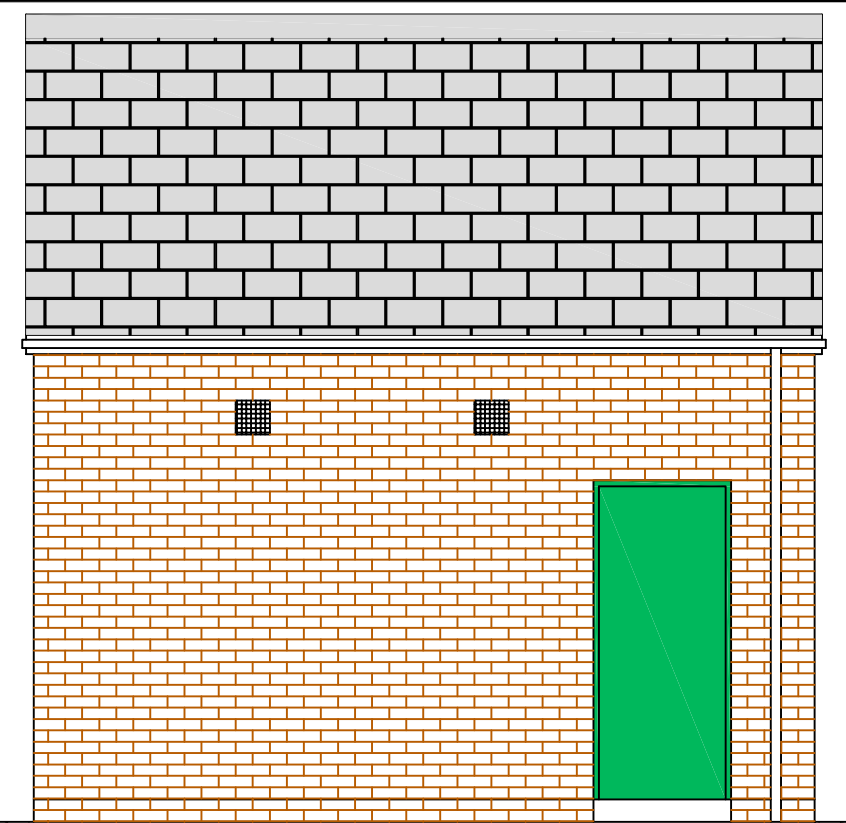
Plot date: 26-Feb-15



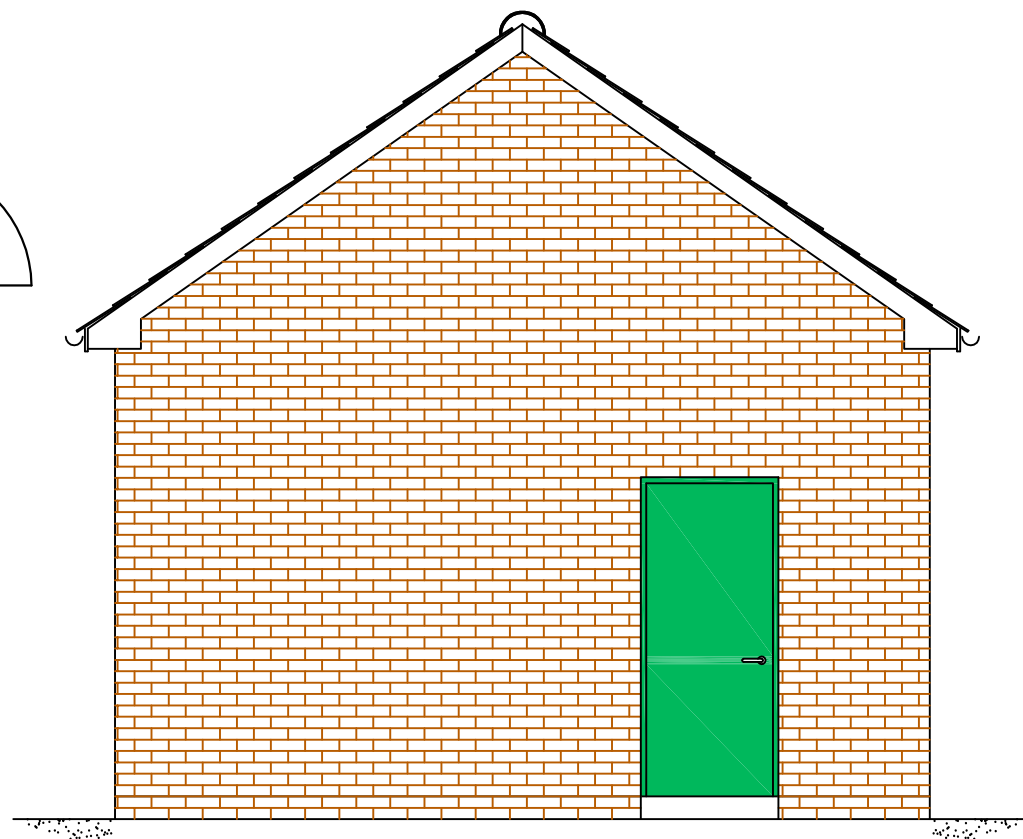
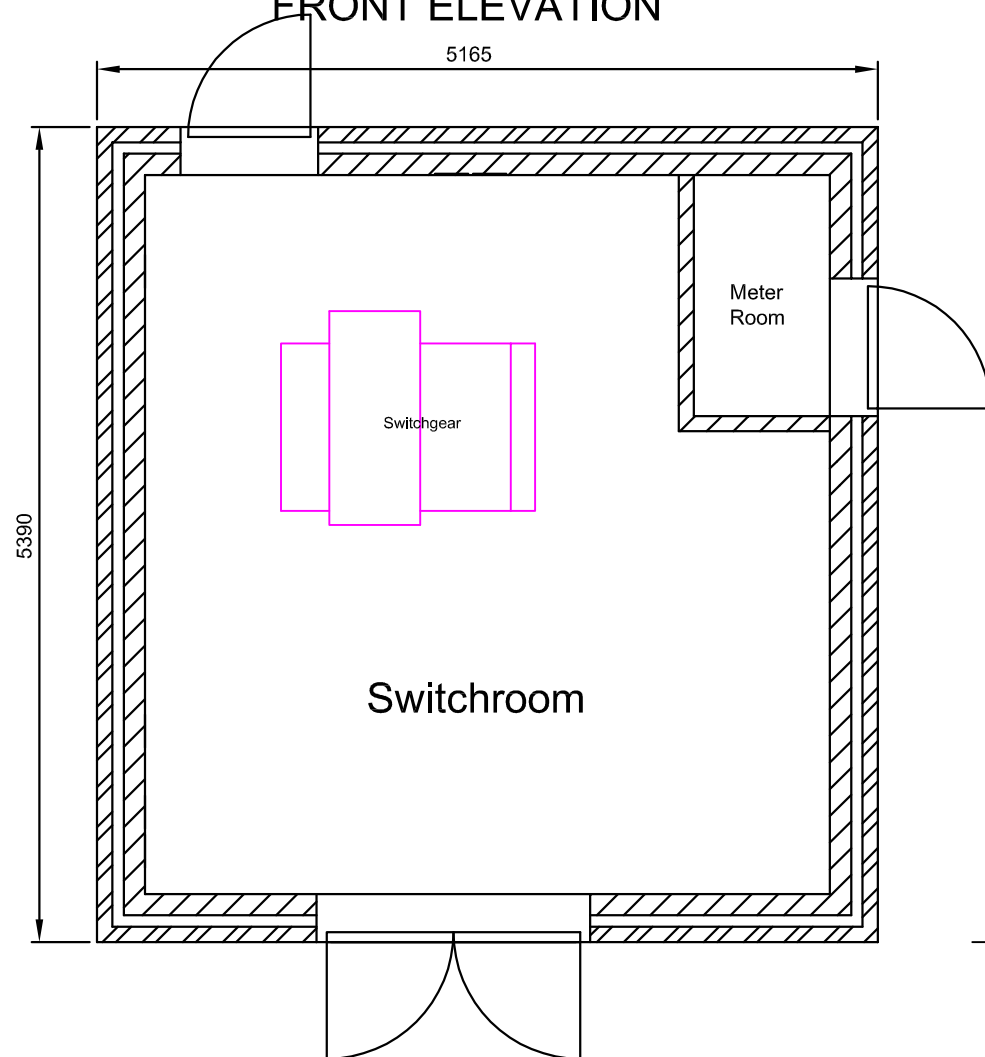
FRONT ELEVATION



SIDE ELEVATION



SIDE ELEVATION



REAR ELEVATION

Construction specification

General

Building to be adopted by the Local Electrical Distribution Company.

Masonry

Facing brick colour and type to be agreed with the local planning authority.

Doors

Doors are to be polyester powder coated generally in 14C39 Green.

Roof Construction

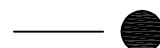
Roof tiles type and colour to be agreed with the local planning authority.



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Project Title:

STANDARD DETAIL

Drawing Title:

33Kv Substation

Scale: 1:50 @ A3

Date: Dec 2014

Drawing No:

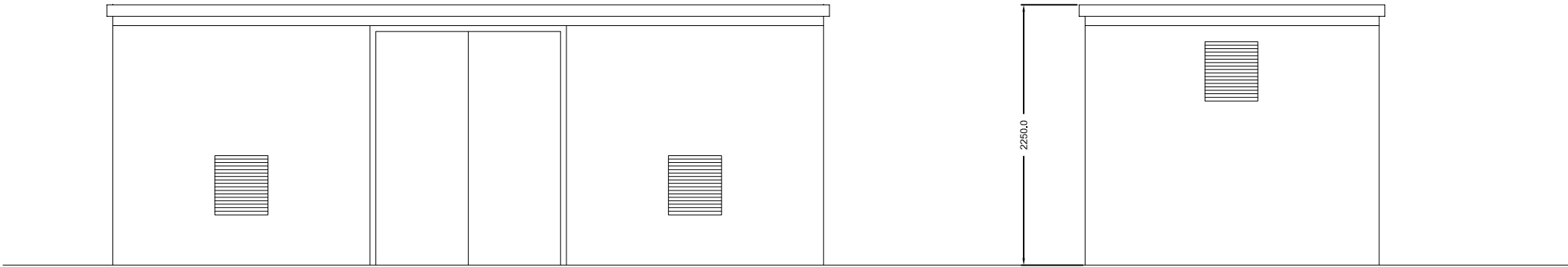
STD/012

Plot date: 5-Jan-15

Drawn: DMS

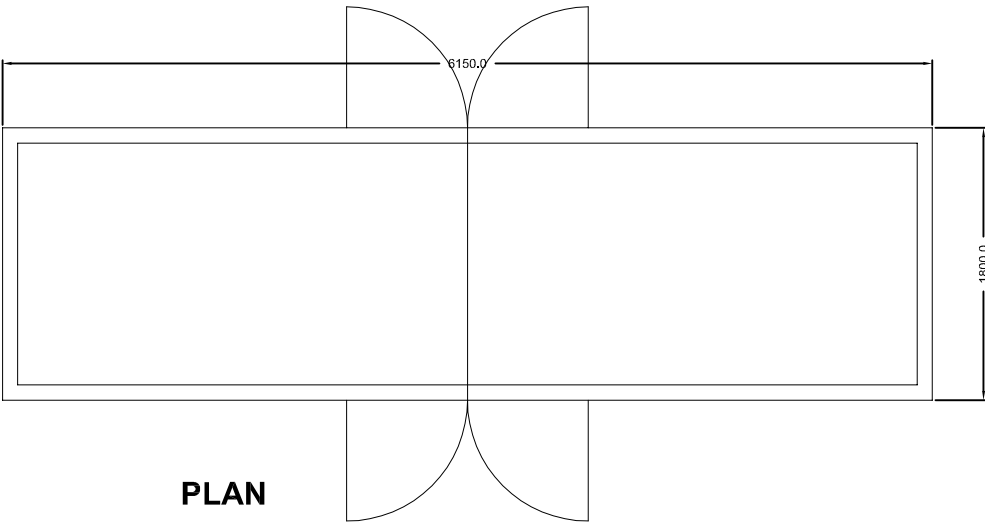
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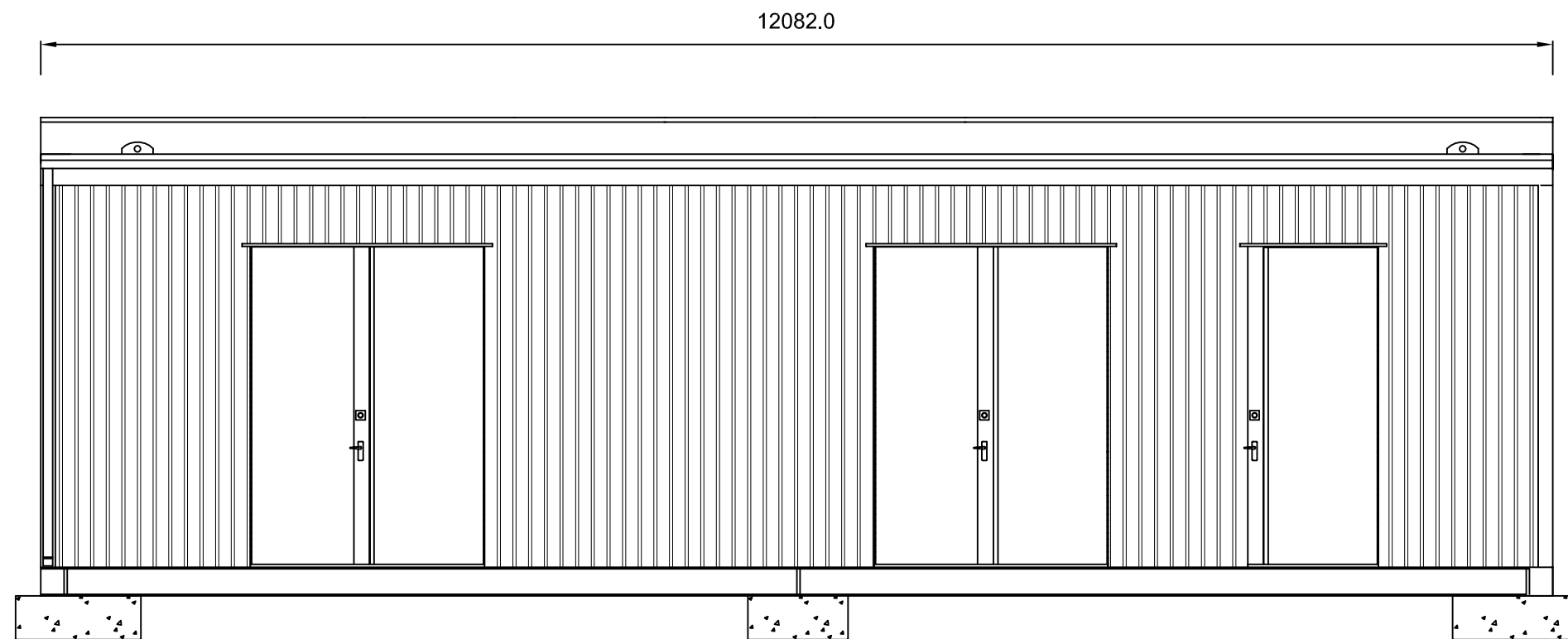
GF Energy Ltd, 17 The Courtyard, Gorse Lane, Coleshill, Birmingham, B46 1JA Tel: 01675 437777	
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Rev.		Date.	By.
A	Manufacturers spec change	26.2.15	LJN
B	Manufacturers spec change	21.4.15	SI
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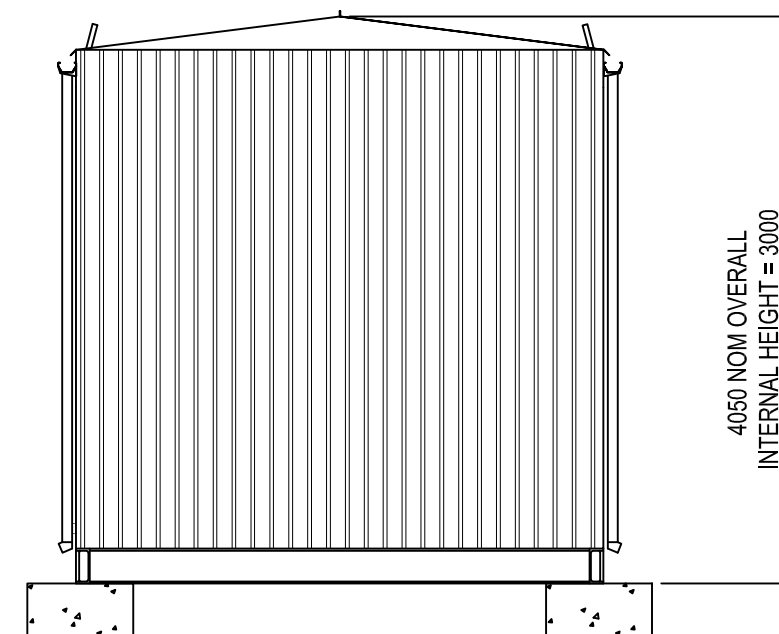
Project Title:
STANDARD DETAIL

Drawing Title:
Gas Governor Kiosk

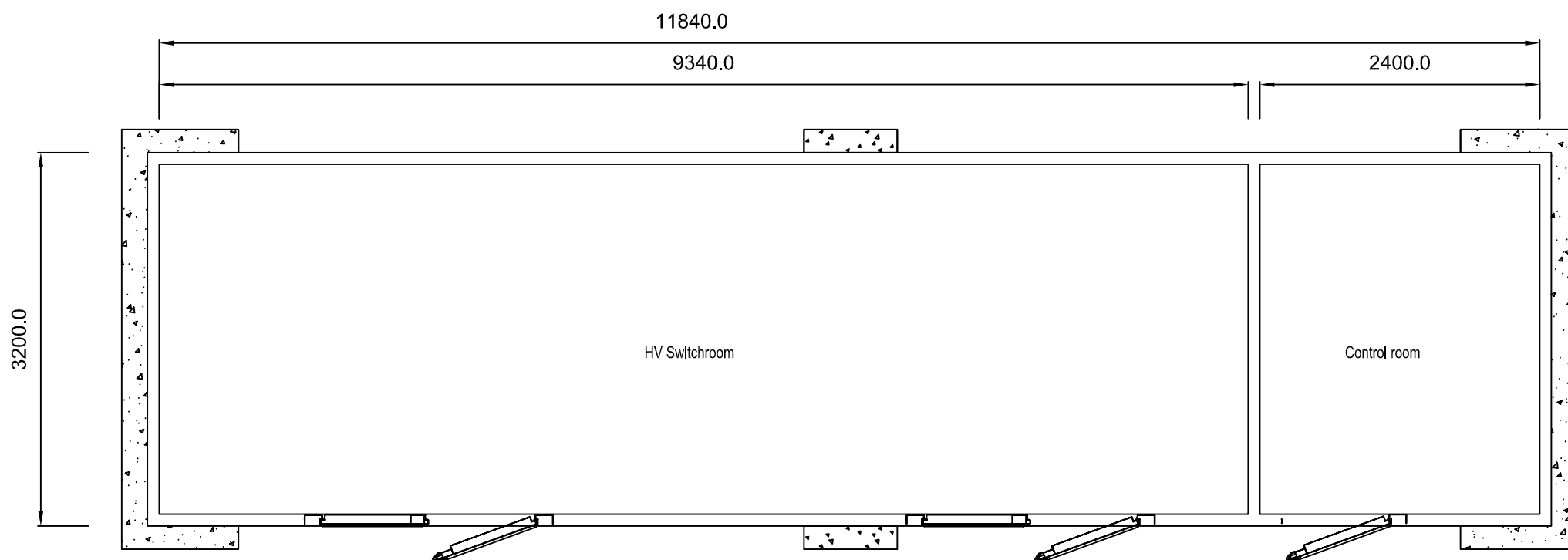
Scale: 1:50 @ A3	Drawn: LJN
Date: Dec 2014	Checked:
Drawing No:	Rev:
STD/013	B
Plot date: 21-Apr-15	



FRONT ELEVATION



END ELEVATION



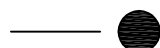
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Project Title:

STANDARD DETAIL

Drawing Title:

12m long Switchroom

Scale: 1:50 @ A3

Date: Dec 2014

Drawing No:

STD/019

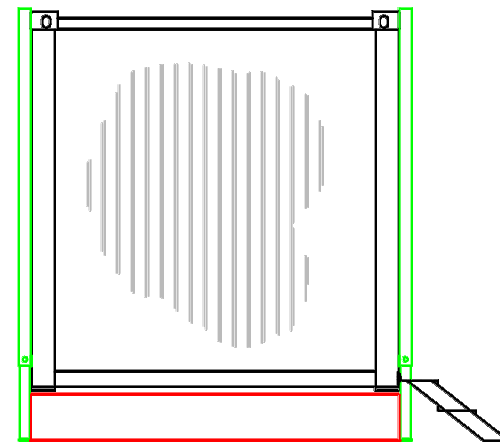
Plot date: 6-Jan-15

Drawn: DMS

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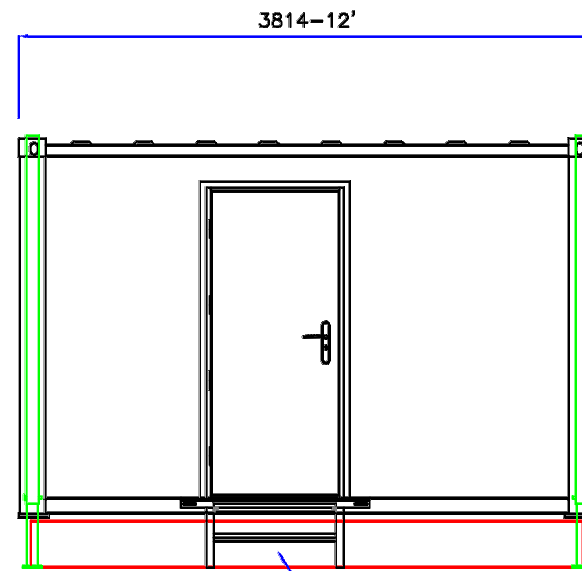
Rev:

View C-C



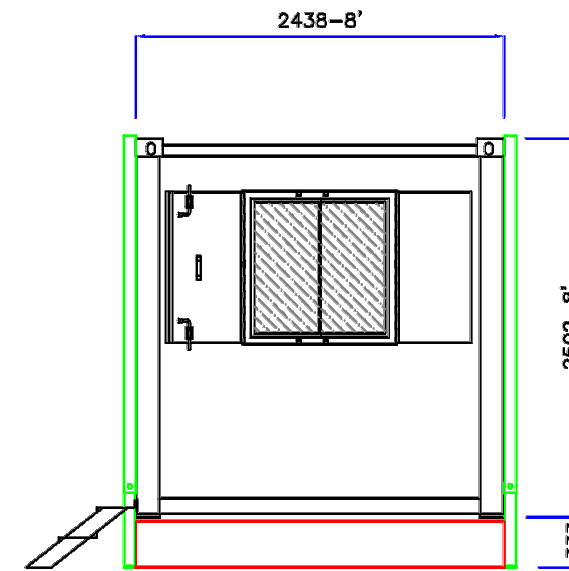
Unit Supported On
Jacklegs Above
Effluent Tank

View A-A

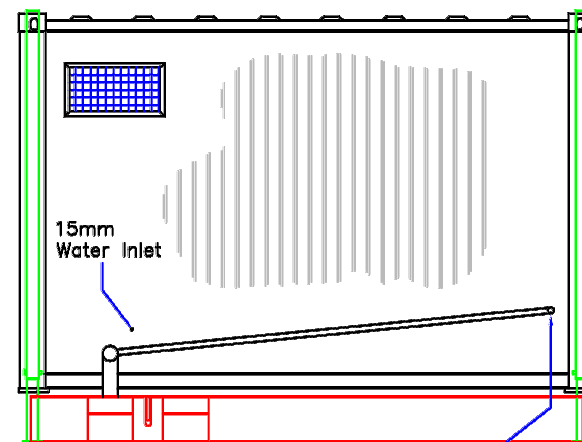


Pre Fabricated
Steel Stairs Bolted
To Unit

View B-B



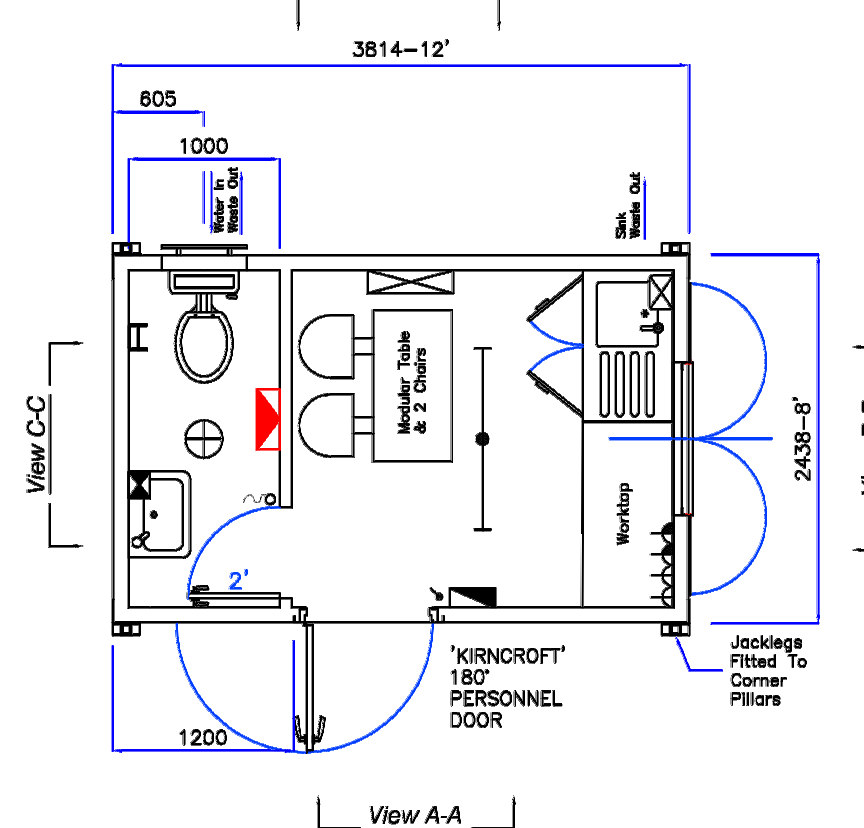
View D-D



100mm Waste
Into Effluent Tank

40mm Sink
Waste Into
Effluent Tank

View D-D



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Project Title:
STANDARD DETAIL

Drawing Title:
Welfare Cabin

Scale: 1:50 @ A3

Date: Dec 2014

Drawing No:

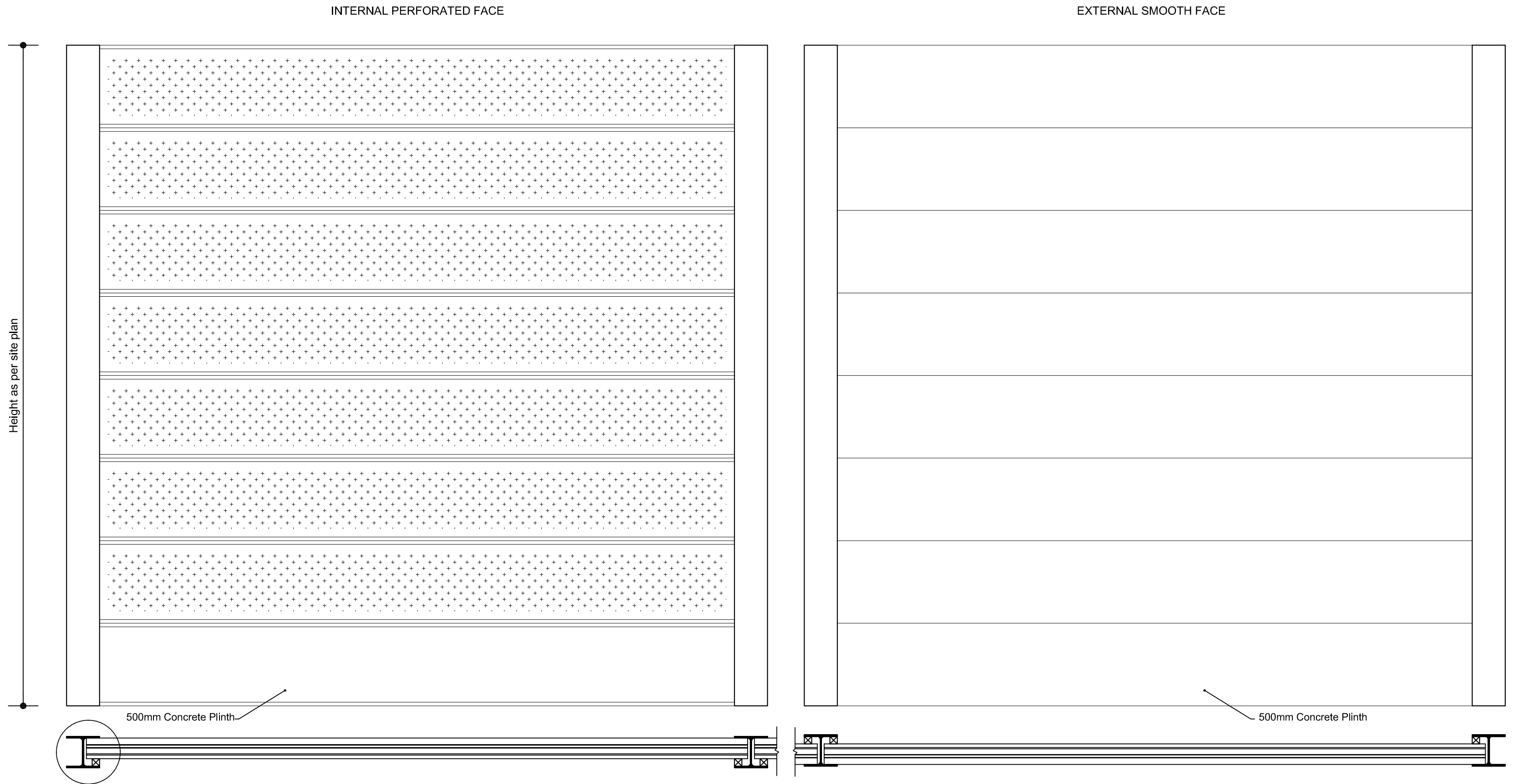
STD/021

Plot date: 6-Jan-15

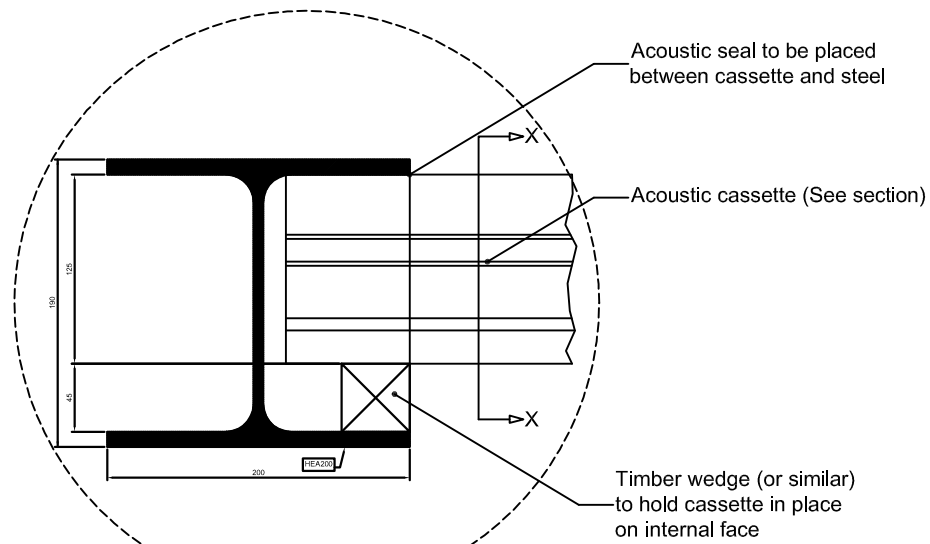
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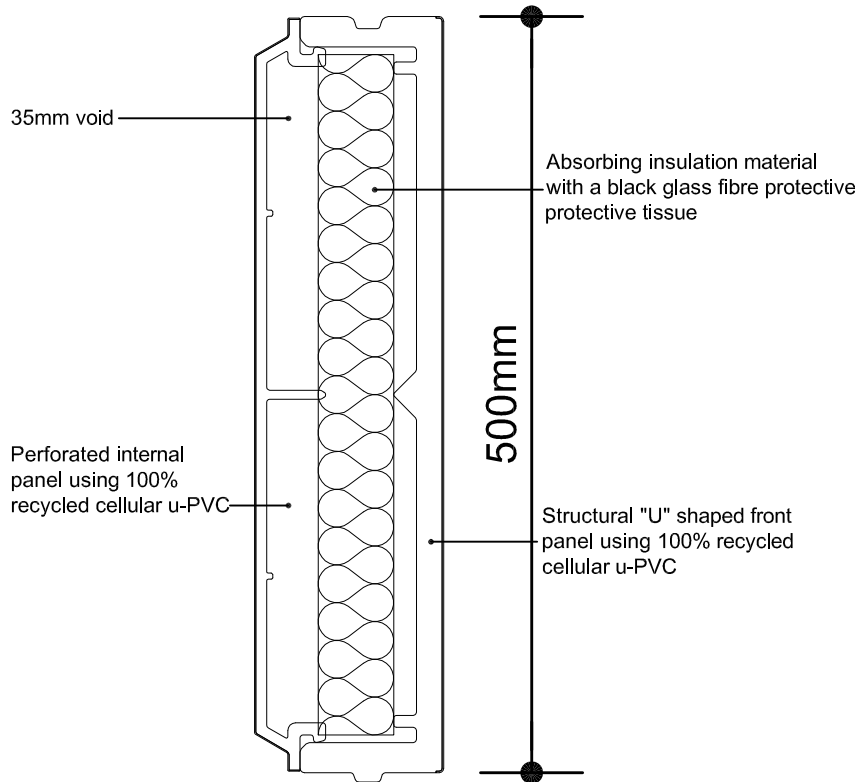
Rev:



PLAN OF FENCING PANELS



SECTION OF FENCING POST



SECTION THROUGH 'X-X'



TYPICAL INSTALLATION ADJACENT RAILWAY

Scale
0 5 10 15 20[m]

REVISIONS

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Unit 17 The Courtyard, Gorsey Lane,
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Tel: 01675 437777

Project Title
Standard Detail

Drawing Title
Acoustic Fencing

Scale 1:20-1:5@ A2 Date Feb 15
Drawn DMS Checked
Drawing No. Rev.

STD/023

Plot date: 13-Feb-15

ZENITH SYSTEM



HIGH SECURITY WELDED MESH FENCING SYSTEM



IDEAL FOR GENERAL AND HIGH SECURITY - Tight mesh pattern maximises intruder delay time

ANTI-CLIMB - No finger or toe holds

AVAILABLE FROM 1.8MTR TO 5.2MTR HIGH

SECURITY TOPPINGS AS OPTIONAL EXTRAS - Barbed wire or razor wire

...where EXCELLENCE is TRADITION

SECURITY

The Heras Zenith security welded mesh system is designed to achieve the highest level of security, providing peace of mind to the end user. Whether the requirement is for general or high security this system fits the bill.

The Zenith mesh panels provide a high degree of security, whilst giving a discreet visual impact on the environment. The mesh apertures provide see through visibility but ensure that the fence is difficult to climb as it doesn't provide finger or toe holds and is also extremely difficult to cut.

GENERAL SECURITY

Available from 1.8mtr to 2.4mtr high, with typical applications including factories, commercial properties, schools, railways and hospitals.

It is possible to achieve high levels of security using this system without giving an intimidating appearance.



Fence Height	Post Specification	Post fixings	System Ref. No.
1.8mtr	SHS 60mm x 60mm	40mm x 5mm flatbars holed at 295mm c/c	HZGS18
2.0mtr	SHS 60mm x 60mm	40mm x 5mm flatbars holed at 280mm c/c	HZGS20
2.4mtr	SHS 60mm x 60mm	40mm x 5mm flatbars holed at 295mm c/c	HZGS24

HIGH SECURITY

Available from 3.0mtr high to 5.2mtr high, typical applications including airports, railways, ports, utilities and sensitive sites such as research centres, and oil and gas terminals.

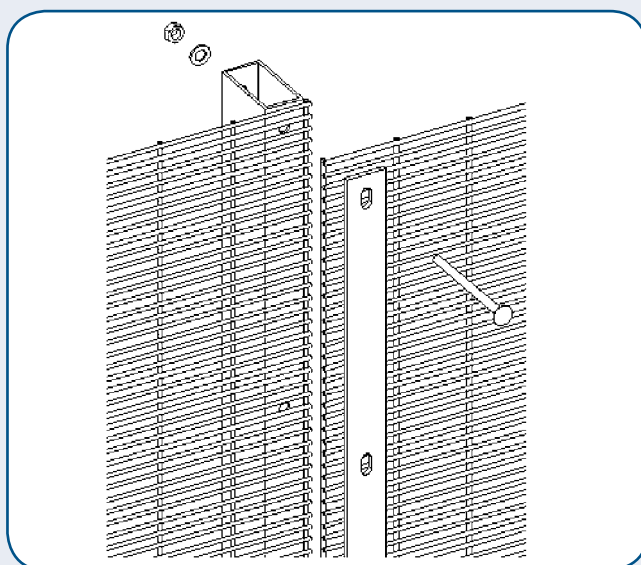
These systems can be enhanced in terms of security, by adding a razor tape topping, either single strands, or concertina, or both.



Fence Height	Post Specification	Post fixings	System Ref. No.
3.0mtr	RHS 80mm x 40mm	40mm x 5mm flatbars holed at 295mm c/c	HZHS30
4.2mtr	SHS 80mm x 80mm	40mm x 5mm flatbars holed at 295mm c/c	HZHS42
5.2mtr	SHS 100mm x 100mm	40mm x 8mm flatbars holed at 300mm c/c	HZHS52

SPECIFICATION

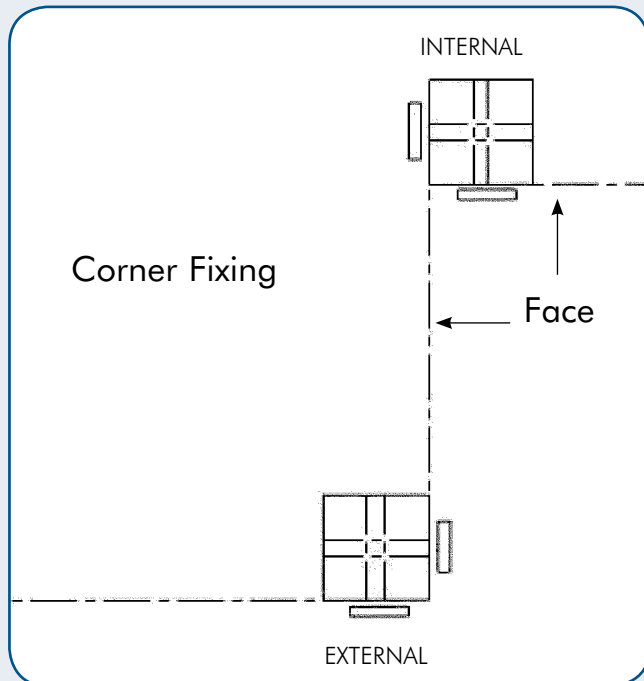
Mesh panels are manufactured from 4mm dia. wire, resistance welded to form a mesh profile of 76.2mm (3.0inches) x 12.7mm (1/2inch). Generally panel widths are 2515mm to suit 2440mm post centres. The panels are overlapped on each post, and secured using clamp bars.



POST DETAILS

The posts used are hollow section steel and the mesh is attached to the face of the post by a flat bar with M8 bolts, standard nut and washer (bolt ends should be burred over).

If corner posts are required, there are two options, internal and external, please see detailed drawing below.

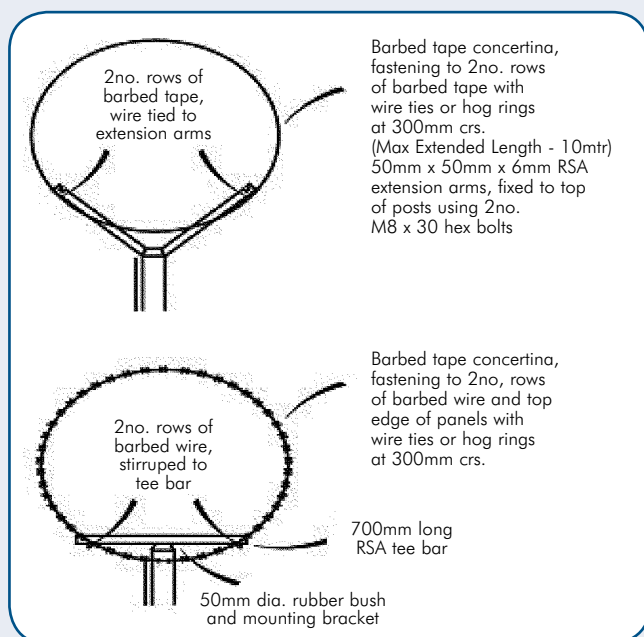


Alternative heights and CHS posts can be offered on request.

SECURITY OPTIONS

Vertical, cranked, T and Y extensions are available for all heights, which are ideal if that extra deterrent is required.

B.T.C ENTANGLEMENT - Concertina coils are available either galvanised or stainless steel finish with coil sizes of 710mm or 965mm diameter. Examples of how they can be used are shown below.



FINISH

Galvanised and polyester coated as standard. Other finishes may be available upon request.

MATCHING GATES STANDARD SWING GATE SIZES AND OPENINGS TO SUIT THE ZENITH SYSTEM.

Gate Width	Leaf Type	90 Deg Opening		180 Deg Opening	
		Between Posts	Overall Posts	Between Posts	Overall Posts
1200mm	S/L	1265mm	1425mm	1205mm	1365mm
3000mm	D/L	3120mm	3280mm	3000mm	3160mm
4000mm	D/L	4120mm	4320mm	4000mm	4200mm
5000mm	D/L	5120mm	5420mm	5000mm	5300mm
6000mm	D/L	6120mm	6420mm	6000mm	6300mm
7000mm	D/L	7150mm	7510mm	7020mm	7380mm
8000mm	D/L	8150mm	8510mm	8020mm	8380mm
9000mm	D/L	9150mm	9550mm	9020mm	9420mm
10000mm	D/L	10150mm	10550mm	10020mm	10420mm

GATE HEIGHTS AVAILABLE

Gates to match the Zenith system at 1.8mtr to 2.4mtr high are supplied as per our swing gate range (please see our swing gate brochure for further details). Single leaf gates to suit 3.0mtr high fence are supplied at 2.0mtr high with a lintel. Double Leaf gates to suit 3.0mtr high fence are supplied at 3.0mtr high, whereas the gates for 4.2mtr high and 5.2mtr high fences take a 3.0mtr high gate with a lintel. (Full height gates can be quoted on request).

As well as swing gates Heras also supplies a range of cantilever and tracked sliding gates.

Full specification details and drawings are available on request, please contact our sales office for more information.

'Secured By Design' is the UK Police Flagship Initiative supporting the principles of 'designing out crime' by use of effective crime prevention. Fencing Systems marked with the SBD logo have been independently tested and approved to SBD standards.

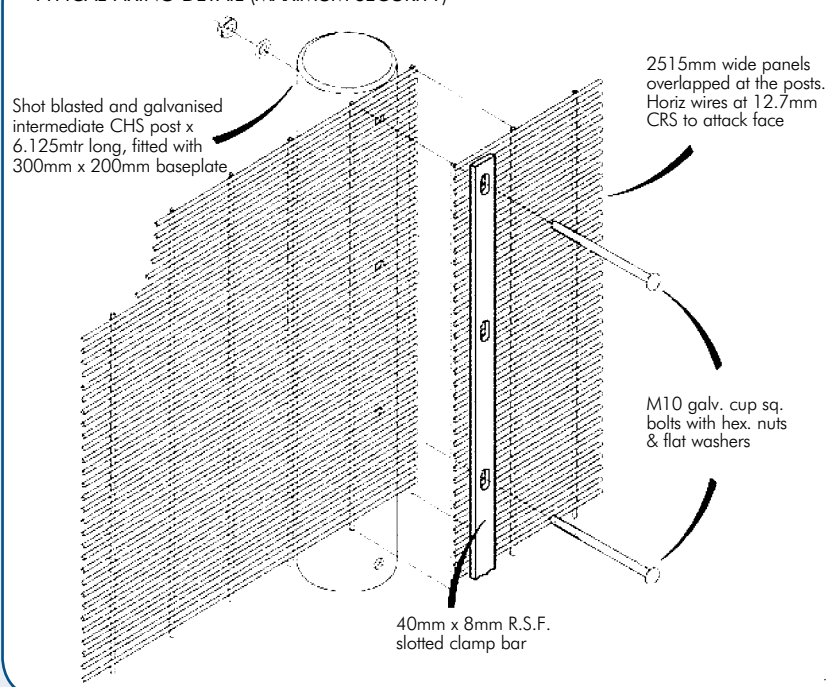
Our aim of continual product improvement requires us to reserve the right to change the specification details contained herein without prior notice.

MAXIMUM SECURITY, SPECIFICATION

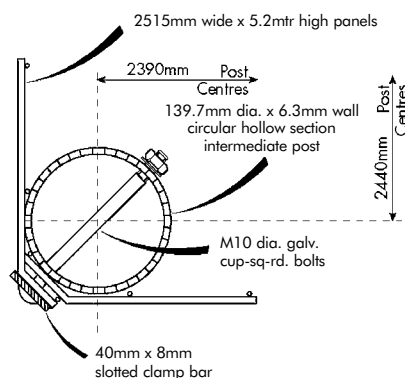
This is essentially the specification used for prisons and other high security institutions.

Fence Height	Mesh Panel	Post Specification	Post fixings	System Ref. No.
5.2mtr	5.2mtr x 2515mm	Hot rolled CHS 139.7mm x 6.3mm x 6.125mtr with welded cap	40mm x 8mm flatbars holed at 152mm c/c c/w M10 bolts and nuts	HZMS52

TYPICAL FIXING DETAIL (MAXIMUM SECURITY)



PLAN OF 90 DEG. EXTERNAL CORNER



Heras U.K. Fencing Systems | Herons Way | Carr Hill | Doncaster | South Yorkshire | DN4 8WA

Tel: **01302 364 551** | Fax: **01302 322 401**

email: **heras.sales@herasuk.co.uk** | Web: **www.heras.co.uk**

Made in compliance with Heras' Quality standards



Appendix B

Planning Application Forms

Town and Country Planning (Development Management Procedure) (England) Order 2010 NOTICE UNDER ARTICLE 11 OF APPLICATION FOR PLANNING PERMISSION

(Notice 1: This notice is to be printed and served on individuals if Certificate B or C is completed)

Proposed development at:

Name or flat number	Land South and West of Ystrad-Isaf off Titanium Road, Timet
Property number or name	
Street	
Locality	
Town	
County	
Postal town	
Postcode	

Take notice that application is being made by:

Organisation name	GF Energy Group		
Applicant name	Title	Forename	
	Surname		

For planning permission to:

Description of proposed development

Proposed gas fuelled capacity mechanism embedded power plant at Titanium Road, Timet

Local Planning Authority to whom the application is being submitted:

City and County of Swansea

Local Planning Authority address:

Civic Centre, Oystermouth Road, Swansea, SA1 3SN

Any owner of the land or tenant who wishes to make representations about this application, should write to the council within 21 days of the date of this notice.

Signatory:

Signatory	Title	Mr	Forename	John
	Surname	Hall		

Signature



Date (dd-mm-yyyy)

07-05-2015

Statement of owners' rights: The grant of planning permission does not affect owners' rights to retain or dispose of their property, unless there is some provision to the contrary in an agreement or lease.

Statement of agricultural tenants' rights: The grant of planning permission for non-agricultural development may affect agricultural tenants' security of tenure.

'Owner' means a person having a freehold interest or a leasehold interest the unexpired term of which is not less than seven years.

'Tenant' means a tenant of an agricultural holding any part of which is comprised in the land.

Once completed this form needs to be served on the owner(s) or tenant(s)

Print Form



Application for Planning Permission. Town and Country Planning Act 1990

Publication of applications on planning authority websites

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website.
If you require any further clarification, please contact the Authority's planning department.

1. Applicant Name, Address and Contact Details

Title:	Mr	First name:	David	Surname:	Sheppard		
Company name:	GF Energy Ltd						
Street address:	17 The Coutryard			Country Code	National Number	Extension Number	
	Gorse Lane			Telephone number:	01675 372512		
	Coleshill			Mobile number:			
Town/City:	Birmingham			Fax number:			
County:				Email address:			
Country:	United Kingdom						
Postcode:	B46 1JA						
Are you an agent acting on behalf of the applicant? ☒ Yes ☐ No							

2. Agent Name, Address and Contact Details

Title:	Mrs	First Name:	Nienke	Surname:	Pengelly		
Company name:	AMEC Foster Wheeler E&I UK Ltd						
Street address:	Canon Court			Country Code	National Number	Extension Number	
	Abbey Lawn			Telephone number:	01743 342042		
	Abbey Foregate			Mobile number:			
Town/City:	Shrewsbury			Fax number:			
County:	Shropshire			Email address:			
Country:	United Kingdom						
Postcode:	SY2 5DE			nienke.pengelly@amecfw.com			

3. Description of the Proposal

Please describe the proposed development including any change of use:

Proposed gas fuelled capacity mechanism embedded power plant at Titanium Road, Timet, near Swansea

Has the building, work or change of use already started? ☐ Yes ☒ No

4. Site Address Details

Full postal address of the site (including full postcode where available)

House:		Suffix:	
House name:			
Street address:	Titanium Road		
	Timet		
Town/City:	Swansea		
County:			
Postcode:			

Description of location or a grid reference
(must be completed if postcode is not known):

Easting:	260657
Northing:	196367

Description:

For site details and description see attached Planning Supporting Statement.

5. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? ☒ Yes ☐ No

If Yes, please complete the following information about the advice you were given (this will help the authority to deal with this application more efficiently):

Officer name:

Title:		First name:	Lynne	Surname:	Davies
--------	----------------------	-------------	------------------------------------	----------	-------------------------------------

Reference:

Date:

Details of the pre-application advice received:

6. Pedestrian and Vehicle Access, Roads and Rights of Way

Is a new or altered vehicle access proposed to or from the public highway? ☐ Yes ☒ No

Is a new or altered pedestrian access proposed to or from the public highway? ☐ Yes ☒ No

Are there any new public roads to be provided within the site? ☐ Yes ☒ No

Are there any new public rights of way to be provided within or adjacent to the site? ☐ Yes ☒ No

Do the proposals require any diversions/extinguishments and/or creation of rights of way? ☐ Yes ☒ No

7. Waste Storage and Collection

Do the plans incorporate areas to store and aid the collection of waste? ☐ Yes ☒ No

Have arrangements been made for the separate storage and collection of recyclable waste? ☐ Yes ☒ No

8. Neighbour and Community Consultation

Have you consulted your neighbours or the local community about the proposal? ☐ Yes ☒ No

9. Authority Employee/Member

With respect to the Authority, I am:

- (a) a member of staff
- (b) an elected member
- (c) related to a member of staff
- (d) related to an elected member

Do any of these statements apply to you? ☐ Yes ☒ No

10. Materials

Please state what materials (including type, colour and name) are to be used externally (if applicable):

10. Materials (continued)

Walls - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Roof - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Windows - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Doors - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Boundary treatments - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2.2 and Appendix A of the Planning Supporting Statement.

Vehicle access and hard standing - description:

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Lighting - add description

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

See Section 2 and Appendix A of the Planning Supporting Statement.

Others - description:

Type of other material:

N/A

Description of *existing* materials and finishes:

N/A

Description of *proposed* materials and finishes:

N/A

Are you supplying additional information on submitted plan(s)/drawing(s)/design and access statement?

☒ Yes ☐ No

If Yes, please state references for the plan(s)/drawing(s)/design and access statement:

See Appendix A of the Planning Supporting Statement.

11. Vehicle Parking

Please provide information on the existing and proposed number of on-site parking spaces:

Type of vehicle	Existing number of spaces	Total proposed (including spaces retained)	Difference in spaces
Cars	0	0	0
Light goods vehicles/public carrier vehicles	0	0	0
Motorcycles	0	0	0
Disability spaces	0	0	0
Cycle spaces	0	0	0
Other (e.g. Bus)	0	0	0
Short description of Other			

12. Foul Sewage

Please state how foul sewage is to be disposed of:

Mains sewer	☐	Package treatment plant	☐	Unknown	☐
Septic tank	☐	Cess pit	☐		
Other					
Effluent tank					

Are you proposing to connect to the existing drainage system? ☐ Yes ☒ No ☐ Unknown

13. Assessment of Flood Risk

Is the site within an area at risk of flooding? (Refer to the Welsh Government's Development Advice Maps website - <http://data.wales.gov.uk/apps/floodmapping/>) ☐ Yes ☒ No

If Yes, and you are proposing a new building or a change of use, please add details of the proposal in the following table:

Floodplain Area	Residential (Number of units)	Non-residential(Area of land - hectares)
Floodplain C1		
Floodplain C2		

If the proposed development is within an area at risk of flooding you will need to consider whether it is appropriate to submit a flood consequences assessment. (Refer to Section 6 and 7 and Appendix 1 of TAN 15 - <http://wales.gov.uk/topics/planning/policy/tans/tan15/?lang=en>)

Is your proposal within 20 metres of a watercourse (e.g. river, stream or beck)? ☐ Yes ☒ No

Will the proposal increase the flood risk elsewhere? ☐ Yes ☒ No

How will surface water be disposed of?

- | | | |
|--|---|------------------------------------|
| ☐ Sustainable drainage system | ☐ Main sewer | ☐ Pond/lake |
| ☒ Soakaway | ☐ Existing watercourse | |

14. Biodiversity and Geological Conservation

To assist in answering the following questions refer to the guidance notes on the Planning Portal website (see "Local level requirements and additional documentation"). The notes provide further information on when there is a reasonable likelihood that any important biodiversity or geological conservation features may be present or nearby and whether they are likely to be affected by your proposals. Having referred to the guidance notes, is there a reasonable likelihood of the following being affected adversely or conserved and enhanced within the application site, or on land adjacent to or near the application site?

a) Protected and priority species:

- ☐ Yes, on the development site ☐ Yes, on land adjacent to or near the proposed development ☒ No

b) Designated sites, important habitats or other biodiversity features:

- ☐ Yes, on the development site ☐ Yes, on land adjacent to or near the proposed development ☒ No

c) Features of geological conservation importance:

- ☐ Yes, on the development site ☐ Yes, on land adjacent to or near the proposed development ☒ No

Supporting Information Requirements

Where a development proposal is likely to affect features of biodiversity or geological conservation interest, you will need to submit, with the application, sufficient information and assessments to allow the local planning authority to determine the proposal.

Failure to submit all information required will result in your application being deemed invalid. It will not be considered valid until all information required by the Local Planning Authority has been submitted.

Your Local Planning Authority will be able to advise on the content of any assessments that may be required.

15. Existing Use

Please describe the current use of the site:

Agricultural land

Is the site currently vacant? ☒ Yes ☐ No

If Yes, please describe the last use of the site:

Agriculture / grazing pasture

When did this use end (if known) (DD/MM/YYYY)?

Does the proposal involve any of the following:

Land which is known to be contaminated? ☐ Yes ☒ No

Land where contamination is suspected for all or part of the site? ☐ Yes ☒ No

A proposed use that would be particularly vulnerable to the presence of contamination? ☐ Yes ☒ No

Application advice

If you have said Yes to any of the above, you will need to submit an appropriate contamination assessment.

Does your proposal involve the construction of a new building? ☐ Yes ☒ No

16. Trees and Hedges

Are there trees or hedges on the proposed development site? ☐ Yes ☒ No

And/or: Are there trees or hedges on land adjacent to the proposed development site that could influence the development or might be important as part of the local landscape character? ☐ Yes ☒ No

If Yes to either or both of the above, you may need to provide a full Tree Survey, at the discretion of your local planning authority. If a Tree Survey is required, this and the accompanying plan should be submitted alongside your application. Your local planning authority should make clear on its website what the survey should contain, in accordance with the current 'BS5837: Trees in relation to design, demolition and construction - Recommendations'.

17. Trade Effluent

Does the proposal involve the need to dispose of trade effluents or waste? ☐ Yes ☒ No

18. Residential Units

Does your proposal include the gain or loss of residential units? ☐ Yes ☒ No

19. All Types of Development: Non-residential Floorspace

Does your proposal involve the loss, gain or change of use of non-residential floorspace? ☐ Yes ☒ No

20. Employment

If known, please complete the following information regarding employees:

	Full-time	Part-time	Equivalent number of full-time
Existing employees	0	0	0
Proposed employees	0	0	0

21. Hours of Opening

If known, please state the hours of opening (e.g. 15:30) for each non-residential use proposed:

Use	Monday to Friday		Saturday		Sunday and Bank Holidays		Not Known
	Start Time	End Time	Start Time	End Time	Start Time	End Time	
Other							☒

22. Site Area

What is the site area? hectares

Does your proposal involve the construction of a new building which would result in the loss or gain of public open space? ☐ Yes ☒ No

23. Industrial or Commercial Processes and Machinery

Please describe the activities and processes which would be carried out on the site and the end products including plant, ventilation or air conditioning. Please include the type of machinery which may be installed on site:

For details see attached Planning Supporting Statement.

Is the proposal for a waste management development? ☐ Yes ☒ No

24. Renewable and Low Carbon Energy

Does your proposal involve the installation of a stand-alone renewable or low-carbon energy development? ☐ Yes ☒ No

25. Hazardous Substances

Is any hazardous waste involved in the proposal? ☐ Yes ☒ No

26. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? ☒ Yes ☐ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact? (Please select only one)

☐ The agent ☒ The applicant ☐ Other person

27. Certificates (Certificate B)

Certificate of Ownership – Certificate B
Town and Country Planning (Development Management Procedure) (Wales) Order 2012

I certify/The applicant certifies that I have/the applicant has given the requisite notice to everyone else (as listed below) who, on the day 21 days before the date of this application, was the owner (owner is a person with a freehold interest or leasehold interest with at least 7 years left to run) of any part of the land or building to which this application relates.

Notice recipient				Date notice served
Name	Alun Davies/Martyn Wadling, Timet UK Ltd			07/05/2015
Number:		Suffix:	House name:	
Street:	Westfield Industrial Park, Titanium Road			
Locality:	Waunarlwydd			
Town:	Swansea			
Postcode:	SA5 4SF			
Name				
Number:		Suffix:	House name:	
Street:				
Locality:				
Town:				
Postcode:				
Name				
Number:		Suffix:	House name:	
Street:				
Locality:				
Town:				
Postcode:				
Name				
Number:		Suffix:	House name:	
Street:				
Locality:				
Town:				
Postcode:				
Name				
Number:		Suffix:	House name:	
Street:				
Locality:				
Town:				
Postcode:				

27. Certificates (Certificate B - continued)

Title:	Mrs	First name:	Nienke	Surname:	Pengelly
Person role:	Agent	Declaration date:	08/05/2015	☒	Declaration made

27. Certificates (Agricultural Holdings Certificate)

**Agricultural Holding Certificate
Town and Country Planning (Development Management Procedure) (Wales) Order 2012**

Agricultural Land Declaration - You Must Select Either A or B

(A) None of the land to which the application relates is, or is part of an agricultural holding. ☒

(B) I have/The applicant has given the requisite notice to every person other than myself/the applicant who, on the day 21 days before the date of this application, was a tenant of an agricultural holding on all or part of the land to which this application relates, as listed below: ☐

Title:	Mrs	First Name:	Nienke	Surname:	Pengelly
Person role:	Agent	Declaration date:	08/05/2015	☒	Declaration Made

28. Declaration

I/we hereby apply for planning permission as described in this form and the accompanying plans/drawings and additional information. I confirm that, to the best of my knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the persons giving them. ☒

Date



Appendix C

Air Quality Assessment

GF Energy Ltd

Air Quality Impact Assessment of Emissions to Atmosphere from Timet Capacity Mechanism Power Plant



March 2015

Amec Foster Wheeler Environment
& Infrastructure UK Limited



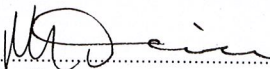
Report for

David Sheppard
Design Manager
GF Energy Ltd
17 The Courtyard
Gorse Lane
Coleshill
Birmingham
B46 1JA

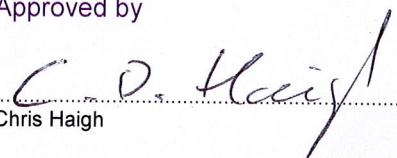
Main contributors

Martin Peirce

Issued by


Martin Peirce

Approved by


Chris Haigh

Amec Foster Wheeler

Sankey House
130 Birchwood Boulevard
Birchwood
Warrington WA3 7QH
United Kingdom
Tel +44 (0)1925 849710

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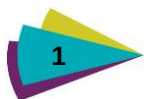
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This document has been produced by Amec Foster Wheeler Environment & Infrastructure UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Document revisions

No.	Details	Date
1	Final Report 15103i1	March 2015



Executive summary

Purpose of this report

This report has been produced for the purpose of assessing the potential impacts on local air quality of emissions associated with the installation of up to 37 engines generating electrical power at a site owned by Timet UK Ltd near Waunarlwydd, Swansea. This assessment forms part of the planning application for the development.

About the assessment

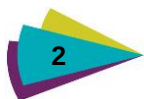
The plant will be operated by GF Energy Ltd and will generate electricity under the Capacity Mechanism to meet intermittent shortfalls in generating capacity on the National Grid. This will be one of several such facilities operated by GF in the UK. The engines will be operated on natural gas. On average the plant will operate for around 5 hours per day at peak times, and around 1200 hours per year (based on historical data and projections from DECC).

The dispersion of emissions in this assessment is predicted using an appropriate dispersion model, with results presented in tabular form and as contours of ground level concentrations on a background map of the area. The assessment considers short and long-term effects in relation to the air quality standards set in legislation and in Government and international guidance. The pollutants covered by the assessment are oxides of nitrogen (NO_x as NO_2) and carbon monoxide (CO). Other pollutants, including particulate matter (PM_{10} and $\text{PM}_{2.5}$) and sulphur dioxide (SO_2), have been screened out as unlikely to be of concern.

This assessment assumes the engines operate for full, hourly periods to predict both the long-term and short-term impacts of engine emissions. Concentrations were calculated for each hourly period during the typical availability windows. This approach ensures that those meteorological conditions conducive to producing elevated ground level concentrations of pollutants are appropriately considered. However, given that the engines will only run for about 5 hours a day and about 1200 hours per year, additional post-processing of raw modelled output has been undertaken, when appropriate.

Summary of conclusions

The impact assessment demonstrates that, under the anticipated operational profile of the plant, exceedances of any AQS, EAL, critical level or critical load are unlikely, or where exceedances are predicted due to the existing baseline concentration or deposition rate, the additional contribution from the plant is not considered to be significant. In addition, the impacts at human receptor locations can be defined as 'negligible' following the guidance issued by Environmental Protection UK. On this basis, air quality factors should not be considered a constraint to development of the site for Capacity Mechanism purposes.



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1. Introduction

1.1 Background, aims and objectives

Amec Foster Wheeler Environment and Infrastructure UK Limited has been commissioned by GF Energy Ltd to undertake an assessment of the potential impacts resulting from emissions associated with the installation of up to 37 engines generating electrical power at a site owned by Timet UK Ltd near Waunarlwydd, Swansea. The plant will generate electricity under the Capacity Mechanism to meet intermittent shortfalls in generating capacity on the National Grid. This will be one of several such facilities operated by GF in the UK.

The preferred generating unit is the Guascor SFGLD 560. This is a spark ignition engine rated at 762 kW electrical output, and capable of operating as a back-up unit in the event of a loss of power or to generate commercially exported power continuously. The engines will be operated on natural gas. On average the plant will operate for around 5 hours per day at peak times, and around 1200 hours per year (based on historical data and projections from DECC).

The purpose of this report is to assess the impacts of emissions to air from the proposed installation on local air quality in order to support the planning application for the development.

The dispersion of emissions in this assessment is predicted using an appropriate dispersion model, with results presented in tabular form and as contours of ground level concentrations on a background map of the area. The assessment considers short and long-term effects in relation to the air quality standards set in legislation and in Government and international guidance.

1.2 Site description

The proposed site is located in a mixed-use area of south Wales, with agriculture, industry, commercial and domestic usage in the vicinity. The site is about 1 km north of the village of Waunarlwydd and about 5 km west of the centre of Swansea. The grid reference for the site is 260650, 196383. Figure 1.1 provides a site location map.

Figure 1.1 Site location



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1.3 Sources of information

The information used to assess air quality includes:

- ▶ Process and emissions data provided by GF Energy;
- ▶ Site layout from GF Energy;
- ▶ Baseline air quality data from surveys undertaken by Government bodies, Local Authorities and third parties;
- ▶ Ordnance Survey maps of the local area; and
- ▶ Meteorological data supplied by Atmospheric Dispersion Modelling Limited.

1.4 Report structure

The remainder of the report is set out as follows:

Table 1.1 Report structure

Section	Aims and Objectives
Section 2	Describes the dispersion model, assessment methodology, model inputs and assumptions used in the assessment, and details the ambient air quality in the area
Section 3	Details the assessment criteria
Section 4	Presents an assessment of the potential air quality impacts arising from the site emissions
Section 5	Contains a summary and conclusions of the assessment

2. Assessment methodology

2.1 The dispersion model

The model used in this assessment is the ADMS 5 atmospheric dispersion model developed and validated by Cambridge Environmental Research Consultants (CERC). The model was used to predict the ground level concentration of compounds emitted to atmosphere from the installation. The model has been used extensively throughout the UK for regulatory compliance purposes and is accepted as an appropriate air quality modelling tool by the Environment Agency and local authorities.

ADMS 5 parameterises stability and turbulence in the atmospheric boundary layer by the Monin-Obukhov length and the boundary layer depth. This approach allows the vertical structure of the boundary layer to be more accurately defined than by the stability classification methods of earlier dispersion models. In ADMS, the concentration distribution follows a symmetrical Gaussian profile in the vertical and crosswind directions in neutral and stable conditions. However, the vertical profile in convective conditions follows a skewed Gaussian distribution to take account of the inhomogeneous nature of the vertical velocity distribution in the Convective Boundary Layer.

A number of complex modules, including the effects of plume rise, complex terrain, coastlines, concentration fluctuations, radioactive decay and buildings effects, are also included in the model, as well as the facility to calculate long-term averages of hourly mean concentration, dry and wet deposition fluxes, and percentile concentrations, from either statistical meteorological data or hourly average data.

A range of input parameters is required including, among others, data describing the local area, meteorological measurements and emissions data. The data used in modelling the emissions are given in the following sections of this chapter.

2.2 Process emissions

The installation will consist of 37 engines, each within their own container building, with individual stacks a short distance above the top of the containers. Model input parameters are given in Table 2.1 and Table 2.2. The process data has been derived from manufacturer's performance data provided by GF. Emissions data are based on BAT guideline limits of 250 mg Nm⁻³ for NO_x and 400 mg Nm⁻³ for CO (Natural Resources Wales 2014). Pollutants other than NO_x and CO have been screened out as unlikely to be of concern.

Table 2.1 Modelled stack characteristics

Parameter	Each engine
Release height (m)	4.5
Flue diameter (m)	0.2
Efflux flow rate (Nm ³ s ⁻¹)	0.84
Efflux temperature (°C)	364

Table 2.2 Modelled stack emission rates

Pollutant	Emission rate (per engine) (g s ⁻¹)
NO _x	0.209
CO	0.335

Capacity Mechanism contracts with the National Grid require operators to guarantee that their plant be available at specific times and days of the week, known as 'availability windows'. This means that the engines will not be running continuously. The availability windows vary by season and year-on-year and are not known more than a year or so in advance. For the current modelling, it was assumed that the facility would be used between the times of 07:00 and 21:00. These windows have been reflected in the model setup by setting the emission rate to 100% of the Table 2.2 values during hours of the availability window, and setting the emission rate to zero outside those hours.

This procedure results in the emissions occurring for a total of 5110 hours per year. In fact, the engines will only operate for up to about 1200 hours per year. Therefore, when calculating annual mean concentrations, a correction factor of $1200/5110 \approx 0.23$ has been applied to the raw model results.

Similarly, the facility is only expected to operate for about 5 hours per day when called. Therefore, maximum 8-hour mean concentrations have been calculated by taking the maximum one-hour concentrations and multiplying by $5/8 = 0.625$.

2.3 Meteorology

For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made. The year of meteorological data that is used for a modelling assessment can also have a significant effect on ground level concentrations.

This assessment has used meteorological data recorded at the Mumbles Head meteorological station from 2010 to 2014. The meteorological station is located approximately 10 km south of the site and is the nearest synoptic station to the site offering data in a suitable format for the model. The following figures show wind roses for each year modelled, illustrating the frequency of monitored wind direction and wind speed.

Figure 2.1 2010 wind rose

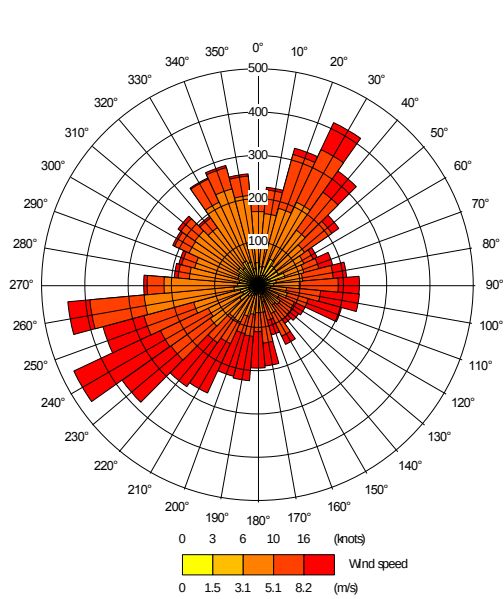


Figure 2.2 2011 wind rose

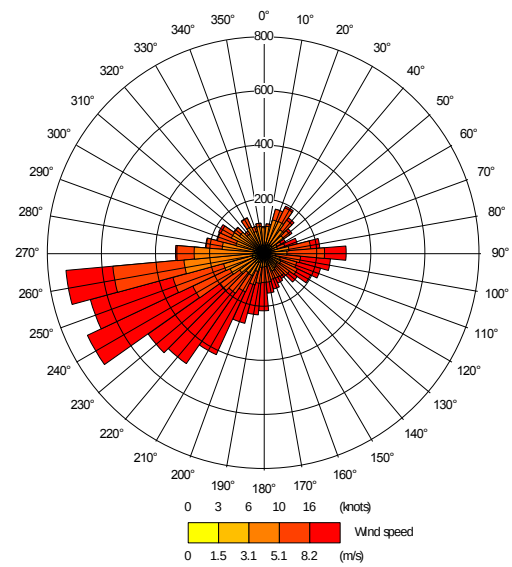


Figure 2.3 2012 wind rose

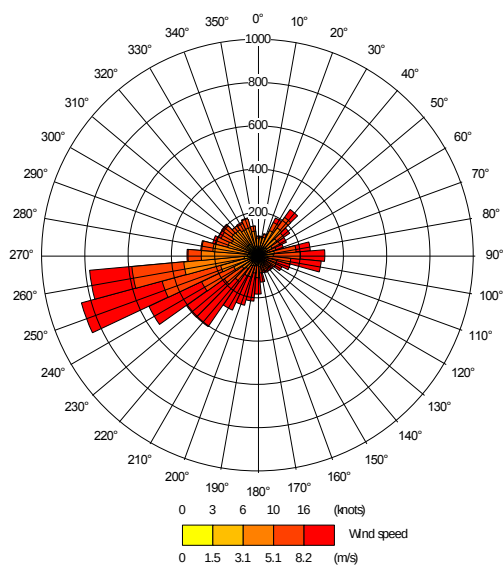


Figure 2.4 2013 wind rose

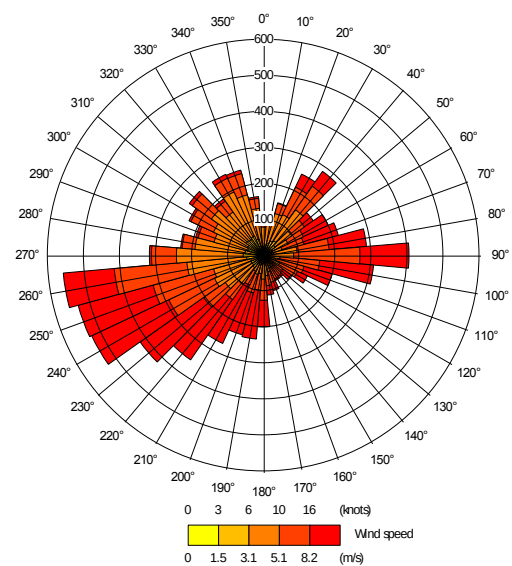
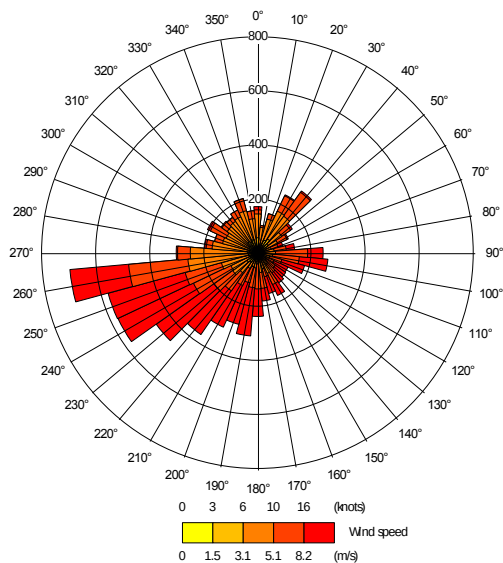


Figure 2.5 2014 wind rose



2.4 Surface characteristics

The predominant surface characteristics and land use in a model domain have an important influence in determining turbulent fluxes and, hence, the stability of the boundary layer and atmospheric dispersion. Factors pertinent to this determination are detailed below.

Surface roughness

Roughness length, z_0 , represents the aerodynamic effects of surface friction and is defined as the height at which the extrapolated surface layer wind profile tends to zero. This value is an important parameter used by meteorological pre-processors to interpret the vertical profile of wind speed and estimate friction velocities which are, in turn, used to define heat and momentum fluxes and, consequently, the degree of turbulent mixing.

The surface roughness length is related to the height of surface elements; typically, the surface roughness length is approximately 10% of the height of the main surface features. Thus, it follows that surface roughness is higher in urban and congested areas than in rural and open areas. Oke (1987) and CERC (2003) suggest typical roughness lengths for various land use categories (Table 2.3).

Table 2.3 Typical surface roughness lengths for various land use categories

Type of Surface	z_o (m)
Ice	0.00001
Smooth snow	0.00005
Smooth sea	0.0002
Lawn grass	0.01
Pasture	0.2
Isolated settlement (farms, trees, hedges)	0.4
Parkland, woodlands, villages, open suburbia	0.5-1.0
Forests/cities/industrialised areas	1.0-1.5
Heavily industrialised areas	1.5-2.0

Increasing surface roughness increases turbulent mixing in the lower boundary layer. With respect to elevated sources under neutral and stable conditions, increasing the roughness length can have complex and conflicting effects on ground level concentrations:

- ▶ The increased mixing can bring portions of an elevated plume down towards ground level, resulting in increased ground level concentrations close to the emission source; and
- ▶ The increased mixing increases entrainment of ambient air into the plume and dilutes plume concentrations, resulting in reduced ground level concentrations further downwind from an emission source.

The overall impact on ground level concentration is, therefore, strongly correlated with the distance of a receptor from the emission source.

Surface energy budget

One of the key factors governing the generation of convective turbulence is the magnitude of the surface sensible heat flux. This, in turn, is a factor of the incoming solar radiation. However, not all solar radiation arriving at the Earth's surface is available to be emitted back to atmosphere in the form of sensible heat. By adopting a surface energy budget approach, it can be identified that, for fixed values of incoming short and long wave solar radiation, the surface sensible heat flux is inversely proportional to the surface albedo and latent heat flux.

The surface albedo is a measure of the fraction of incoming short-wave solar radiation reflected by the Earth's surface. This parameter is dependent upon surface characteristics and varies throughout the year. Oke (1987) recommends average surface albedo values of 0.6 for snow covered ground and 0.23 for non-snow covered ground, respectively.

The latent heat flux is dependent upon the amount of moisture present at the surface. Areas where moisture availability is greater will experience a greater proportion of incoming solar radiation released back to atmosphere in the form of latent heat, leaving less available in the form of sensible heat and, thus, decreasing convective turbulence. The modified Priestly-Taylor parameter (α) can be used to represent the amount of moisture available for evaporation. Holstag and van Ulden (1983) suggest values of 0.45 and 1.0 for dry grassland and moist grassland respectively.

Selection of appropriate surface characteristic parameters for the site

A detailed analysis of the effects of surface characteristics on ground level concentrations by Auld *et al.* (2002) led them to conclude that, with respect to uncertainty in model predictions:

"...the energy budget calculations had relatively little impact on the overall uncertainty".

In this regard, it is not considered necessary to vary the surface energy budget parameters spatially or temporally, and annual averaged values have been adopted throughout the model domain for this assessment.

As snow covered ground is only likely to be present for a small fraction of the year, the surface albedo of 0.23 for non-snow covered ground advocated by Oke (1987) has been used whilst the model default α value of 1.0 has also been retained.

In view of the mix of built-up and open land around the site, a roughness length of 0.75 m was used.

2.5 Buildings

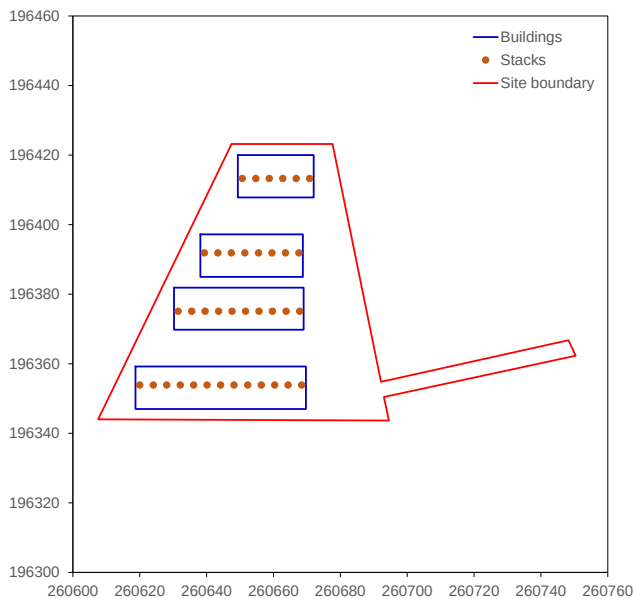
Any large object has an impact on atmospheric flow and air turbulence within the locality of the object. This can result in maximum ground level concentrations that are significantly different (generally higher) from those encountered in the absence of buildings. The building 'zone of influence' is generally regarded as extending a distance of $5L$ (where L is the lesser of the building height or width) from the foot of the building in the horizontal plane and three times the height of the building in the vertical plane.

The containers housing the engines could influence the airflow close to the emissions sources. The engine containers consist of a large number of buildings grouped closely together, so for the purposes of modelling they have been simplified down to just four buildings. Table 2.4 and Figure 2.6 detail the buildings as they are included in the model. ADMS performs further simplification, reducing the buildings to a single effective building, the parameters of which depend on wind direction.

Table 2.4 Buildings modelled

Building	X (m)	Y (m)	Height (m)	Length (m)	Width (m)	Angle (°)
Engines 1-6	260661	196414	3	12	23	180
Engines 7-14	260653	196391	3	12	31	180
Engines 15-24	260650	196376	3	12	39	180
Engines 25-37	260644	196353	3	12	51	180

Figure 2.6 Visualisation of buildings and release points included in the model



2.6 Terrain

The concentrations of an emitted pollutant found in elevated, complex terrain differ from those found in simple level terrain. There have been numerous studies on the effects of topography on atmospheric flows. The UK ADMLC provides a summary of the main effects of terrain on atmospheric flow and dispersion of pollutants (Hill *et al.*, 2005):

- ▶ *"Plume interactions with windward facing terrain features:*
 - ▶ *Plume interactions with terrain features whereby receptors on hills at a similar elevation to the plume experience elevated concentrations;*
 - ▶ *Direct impaction of the plume on hill slopes in stable conditions;*
 - ▶ *Flow over hills in neutral conditions can experience deceleration forces on the upwind slope, reducing the rate of dispersion and increasing concentrations; and*
 - ▶ *Recirculation regions on the upwind side of a hill can cause partial or complete entrainment of the plume, resulting in elevated ground level concentrations.*
- ▶ *Plume interactions with lee sides of terrain features:*
 - ▶ *Regions of recirculation behind steep terrain features can rapidly advect pollutants towards the ground culminating in elevated concentrations; and*
 - ▶ *As per the upwind case, releases into the lee of a hill in stable conditions can also be recirculated, resulting in increased ground level concentrations.*
- ▶ *Plume interactions within valleys:*
 - ▶ *Releases within steep valleys experience restricted lateral dispersion due to the valley sidewalls. During stable overnight conditions, inversion layers develop within the valley essentially trapping all emitted pollutants. Following sunrise and the erosion of the inversion, elevated ground level concentrations can result during fumigation events; and*
 - ▶ *Convective circulations in complex terrain due to differential heating of the valley side walls can lead to the impingement of plumes due to crossflow onto the valley sidewalls and the subsidence of plume centrelines, both having the impact of increasing ground level concentrations."*

These effects are most pronounced when the terrain gradients exceed 1 in 10, i.e. a 100 m change in elevation per 1 km step in the horizontal plane. Some of the gradients surrounding the site are above this criterion, so terrain data from the Ordnance Survey's Panorama dataset was included in the model.

2.7 Modelled domain and receptors

Modelled domain

A 2 km × 2 km Cartesian grid centred on the site was modelled, with a receptor resolution of 20 m, to assess the impact of atmospheric emissions from the site on local air quality. This resolution is considered suitable for capturing the maximum process contribution from site emissions, given that the receptors of interest are more than 100 m from the source.

In addition, a 30 km × 30 km Cartesian grid centred on the site was modelled, with a receptor resolution of 300 m, to supplement the specific receptors more than 1 km from the site (particularly the ecological receptors).

Human receptors

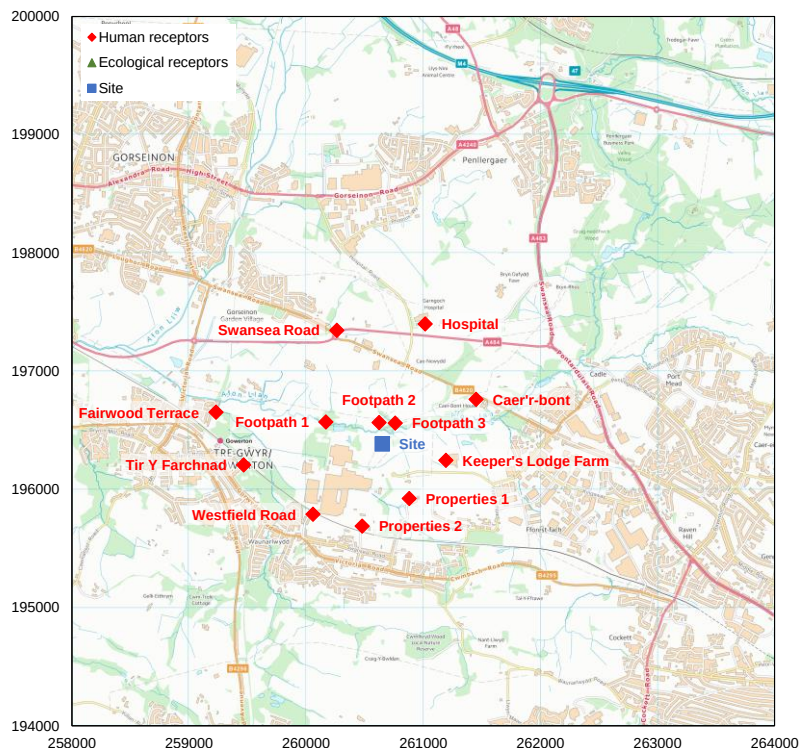
The receptors considered were chosen based on locations where people may be located and judged in terms of the likely duration of their exposure to pollutants and proximity to the site, following the guidance given in Section 3 of this report. Details of the locations of human receptors are given in Table 2.5 and Figure 2.7 below. Note that the Footpath 1–3 receptors are only relevant locations for 1-hour averaging periods, not for 8-hour averaging periods or annual means.

For the purposes of assessing air quality impacts, workplace locations have been excluded from the assessment in accordance with Schedule 1, Part 1, Paragraph 2 of the Air Quality Standards Regulations 2010. These Regulations are detailed in Section 3 of this report and do not differentiate between whether this is a workplace location under the control of the operator, or an off-site workplace location.

Table 2.5 Details of modelled human receptors

ID	Receptor Name	Easting (m)	Northing (m)	Height (m)
1	Keeper's Lodge Farm	261193	196246	1.6
2	Properties 1	260879	195923	1.6
3	Properties 2	260478	195689	1.6
4	Westfield Road	260058	195789	1.6
5	Tir Y Farchnad	259466	196207	1.6
6	Fairwood Terrace	259229	196652	1.6
7	Swansea Road	260261	197346	1.6
8	Hospital	261016	197398	1.6
9	Caer'r-bont	261451	196761	1.6
10	Footpath 1	260168	196569	1.6
11	Footpath 2	260622	196565	1.6
12	Footpath 3	260760	196560	1.6

Figure 2.7 Location of modelled human receptors



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Ecological receptors

The Environment Agency's Horizontal Guidance Note H1 Annex F requires detailed dispersion modelling to be carried out based on local receptors. With regard to ecological receptors H1 Annex F states:

"Note that conservation sites need only be considered where they fall within set distances of the activity:

- ▶ *Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites within 10 km of the installation (or 15 km coal or oil-fired power station); and*
- ▶ *Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodland within 2 km of the location.*

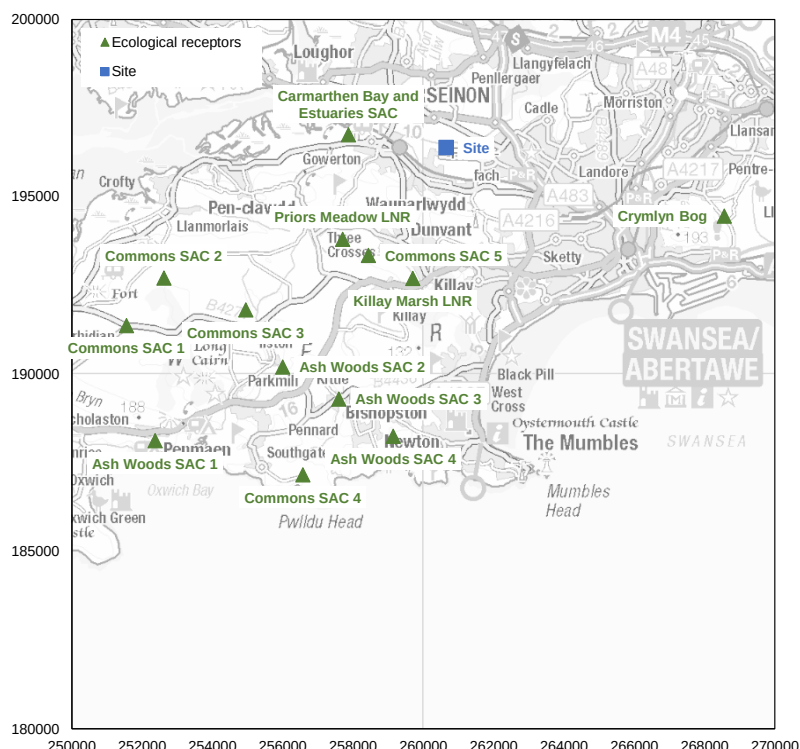
Some larger emitters may be required to screen to 10 km or 15 km for SSSIs."

Following the above guidance, the following ecological receptors have been included in the assessment (Table 2.6 and Figure 2.8). Although several of these are outside the above criteria, they have been included for definiteness.

Table 2.6 Details of modelled ecological receptors

Receptor Name	Easting (m)	Northing (m)	Height (m)	Receptor Type
Carmarthen Bay and Estuaries SAC	257866	196746	0	Marine areas, Sea inlets (82.1%) Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) (13.7%)
Crymlyn Bog SAC	268559	194455	0	Bogs, Marshes, Water fringed vegetation, Fens (86%)
Gower Ash Woods SAC 1	252365	188124	0	Broad-leaved deciduous woodland (90.6%)
Gower Ash Woods SAC 2	255997	190197	0	Broad-leaved deciduous woodland (90.6%)
Gower Ash Woods SAC 3	257595	189297	0	Broad-leaved deciduous woodland (90.6%)
Gower Ash Woods SAC 4	259142	188247	0	Broad-leaved deciduous woodland (90.6%)
Gower Commons SAC 1	251553	191368	0	Heath, Scrub, Maquis and Garrigue, Phygrana (75.2%)
Gower Commons SAC 2	252616	192709	0	Heath, Scrub, Maquis and Garrigue, Phygrana (75.2%)
Gower Commons SAC 3	254947	191811	0	Heath, Scrub, Maquis and Garrigue, Phygrana (75.2%)
Gower Commons SAC 4	256573	187161	0	Heath, Scrub, Maquis and Garrigue, Phygrana (75.2%)
Gower Commons SAC 5	258434	193349	0	Heath, Scrub, Maquis and Garrigue, Phygrana (75.2%)
Killay Marsh LNR	259700	192700	0	Wet woodland, swamp and marsh, fen, wet heath, drier grassland and woodland
Priors Meadow LNR	257700	193800	0	Secondary mixed deciduous and wet woodland and lowland meadow

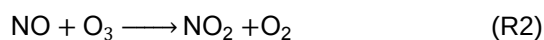
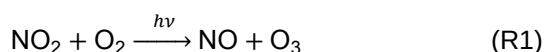
Figure 2.8 Location of modelled ecological receptors



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2.8 Conversion of NO to NO₂

Emissions of NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to nitrogen dioxide (NO₂). NO_x chemistry in the lower troposphere is strongly interlinked in a complex chain of reactions involving Volatile Organic Compounds (VOCs) and Ozone (O₃). Two of the key reactions interlinking NO and NO₂ are detailed below:



where $h\nu$ is used to represent a photon of light energy (i.e. sunlight).

Taken together, reactions R1 and R2 produce no net change in O₃ concentrations, and NO and NO₂ adjust to establish a near steady state reaction (photo-equilibrium). However, the presence of VOCs and CO in the atmosphere offer an alternative production route of NO₂ for photolysis, allowing O₃ concentrations to increase during the day with a subsequent decrease in the NO₂:NO_x ratio.

However, at night, the photolysis of NO₂ ceases, allowing reaction R2 to promote the production of NO₂, at the expense of O₃, with a corresponding increase in the NO₂:NO_x ratio.

Near to an emission source of NO, the result is a net increase in the rate of reaction R2, suppressing O₃ concentrations immediately downwind of the source, and increasing further downwind as the concentrations of NO begin to stabilise to typical background levels (Gillani and Pliem 1996).

Given the complex nature of NO_x chemistry, the Environment Agency's Air Quality Modelling and Assessment Unit (AQMAU) have adopted a pragmatic, risk based approach in determining the conversion rate of NO to NO₂ which dispersion model practitioners can use in their detailed assessments (Environment

Agency, no date). AQMAU guidance advises that the source term should be modelled as NO_x (as NO₂) and then suggests a tiered approach when considering ambient NO₂:NO_x ratios:

- ▶ **Screening Scenario:** 50% and 100% of the modelled NO_x process contributions should be used for short-term and long-term average concentration, respectively. That is, 50% of the predicted NO_x concentrations should be assumed to be NO₂ for short-term assessments and 100% of the predicted NO_x concentrations should be assumed to be NO₂ for long-term assessments;
- ▶ **Worst Case Scenario:** 35% and 70% of the modelled NO_x process contributions should be used for short-term and long-term average concentration, respectively. That is, 35% of the predicted NO_x concentrations should be assumed to be NO₂ for short-term assessments and 70% of the predicted NO_x concentrations should be assumed to be NO₂ for long-term assessments; and
- ▶ **Case Specific Scenario:** Operators are asked to justify their use of percentages lower than 35% for short-term and 70% for long-term assessments in their application reports.

In line with the AQMAU guidance, this assessment has used the 'Worst Case Scenario' approach in determining the conversion rate of NO to NO₂ as a robust assumption.

2.9 Deposition

The predominant route by which emissions will affect land in the vicinity of a process is by deposition of atmospheric emissions. Ecological receptors can potentially be sensitive to the deposition of pollutants, particularly nitrogen and sulphur compounds, which can affect the character of the habitat through eutrophication and acidification.

Deposition processes in the form of dry and wet deposition remove material from a plume and alter the plume concentration. Dry deposition occurs when particles are brought to the surface by gravitational settling and turbulence. They are then removed from the atmosphere by deposition on the land surface. Wet deposition occurs due to rainout scavenging (within clouds) and washout scavenging (below clouds) of the material in the plume. These processes lead to a variation with downwind distance of the plume strength, and may alter the shape of the vertical concentration profile as dry deposition only occurs at the surface.

Near to sources of pollutants (<2 km), dry deposition is generally the predominant removal mechanism for pollutants such as NO_x, SO₂ and NH₃ (Fangmeier *et al.* 1994; Environment Agency, 2011). Dry deposition may be quantified from the near-surface plume concentration and the deposition velocity (Chamberlin and Chadwick, 1953);

$$F_d = v_d C(x, y, 0)$$

where:

F_d = dry deposition flux ($\mu\text{g m}^{-2} \text{s}^{-1}$)

v_d = deposition velocity (m s^{-1})

$C(x, y, 0)$ = ground level concentration ($\mu\text{g m}^{-3}$)

Environment Agency guidance AQTAG06 (Environment Agency, 2011) recommends deposition velocities for various pollutants dependent upon the habitat type (Table 2.7).

Table 2.7 Environment Agency recommended deposition velocities

Pollutant	Deposition Velocity (m s ⁻¹)	
	Grassland	Forest
NO ₂	0.0015	0.003
SO ₂	0.012	0.024
HCl	0.025	0.06
NH ₃	0.02	0.03
HNO ₃	0.04	0.04
SO ₄ ²⁻ (Sulphate aerosol)	0.01	0.01

Source: Environment Agency (2011)

In order to assess the impacts of deposition, habitat-specific critical loads and critical levels have been created. These are generally defined as (e.g. Nilsson and Grennfelt, 1988);

"...a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

It is important to distinguish between a critical load and a critical level. The critical load relates to the quantity of a material deposited from air to the ground, whilst critical levels refer to the concentration of a material in air. The UK Air Pollution Information System (APIS) provides critical load data for ecological sites in the UK.

The critical loads used to assess the impact of compounds deposited to land which result in eutrophication and acidification are expressed in terms of kilograms of nitrogen deposited per hectare per year (kg N ha⁻¹ y⁻¹) and kilo-equivalents deposited per hectare per year (keq ha⁻¹ y⁻¹). The unit of 'equivalents' (eq) is used for the purposes of assessing acidification, rather than a unit of mass. The unit eq (1 keq ≡ 1,000 eq) refers to molar equivalent of potential acidity resulting from e.g. sulphur, oxidised and reduced nitrogen, as well as base cations. Essentially, it means 'moles of charge' and is a measure of how acidifying a particular chemical species can be.

To convert the predicted concentration in air of NO₂, SO₂, NH₃, or HNO₃, the following algorithm is used.

$$DR_i = C_i v_{d_i} f_i$$

Where:

DR_i = annual deposition of N or S (kg N ha⁻¹ y⁻¹ or kg S ha⁻¹ y⁻¹)

C_i = annual mean concentration of the i th chemical species (μg m⁻³)

v_{d_i} = deposition velocity of i th species (Table 2.7)

f_i = factor to convert from μg m⁻² s⁻¹ to kg ha⁻¹ y⁻¹ for the i th species

Table 2.8 provides the relevant conversion factors as extracted from AQTAG06.

Table 2.8 Environment Agency factors for converting modelled deposition rates

Pollutant	Conversion factor ($\mu\text{g m}^{-2} \text{s}^{-1}$ to $\text{kg ha}^{-1} \text{y}^{-1}$ for the <i>i</i> th species)	
	Of	f_i
NO_2	N	96
SO_2	S	157.7
HNO_3	N	70.1
NH_3	N	259.7

Source: Environment Agency (2011)

In order to convert deposition of N or S to acid equivalents, the following relationships can be used:

- ▶ $1 \text{ keq ha}^{-1} \text{y}^{-1} = 14 \text{ kg N ha}^{-1} \text{y}^{-1}$; and
- ▶ $1 \text{ keq ha}^{-1} \text{y}^{-1} = 16 \text{ kg S ha}^{-1} \text{y}^{-1}$.

With respect to wet deposition, Environment Agency (2011) states:

"It is considered that wet deposition of SO_2 , NO_2 and NH_3 is not significant within a short range."

Therefore, the assessment only considers dry deposition of nitrifying and acidifying N and S compounds. The grassland deposition velocities from Table 2.7 are used for the ecological receptors in this assessment.

2.10 Special treatments

Other treatments

Specialised model treatments, for short-term (puff) releases, coastal models, fluctuations or photochemistry were not used in this assessment.

2.11 Existing ambient data

Continuous monitoring data

The City and County of Swansea has ten continuous monitoring stations within its borders, of which five measure NO_2 (a sixth, Morfa, closed in May 2011) (Swansea 2014). Most of these are roadside locations within the urban area of Swansea. One, Cwm Level Park, is an urban background location within the urban area of Swansea, approximately 5 km east of the Timet site; between 2009 and 2013 this site measured annual mean NO_2 levels between $18.5 \mu\text{g m}^{-3}$ and $23.4 \mu\text{g m}^{-3}$. These locations are considered generally unrepresentative of relevant receptors near the Timet site.

Passive monitoring data

The City and County of Swansea operates an extensive passive monitoring network consisting of diffusion tubes recording concentrations of NO_2 at approximately 250 locations within the district (Swansea 2014). All of these are at locations classified as roadside and are within urban areas, so are considered unrepresentative of relevant receptors near the Timet site.

Defra mapped background concentrations

Defra, through its contractor Ricardo-AEA, maintains a nationwide model (the Pollution Climate Mapping (PCM) model) of existing and future background air quality concentrations at a 1 km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO₂, PM₁₀, PM_{2.5}, CO, SO₂ and benzene. The PCM model is semi-empirical in nature: it uses data from the national atmospheric emissions inventory (NAEI) to model the concentrations of pollutants at the centroid of each 1 km grid square but then calibrates these concentrations in relation to actual monitoring data.

Annual mean background data from the PCM model for the receptors considered in this study is detailed in Table 2.9.

Table 2.9 Mapped annual mean background concentrations (µg m⁻³)

Receptor	NO _x	NO ₂	CO	Receptor	NO _x	NO ₂	CO
Keeper's Lodge Farm	12.31	9.61	218	Carmarthen Bay and Estuaries SAC	9.57	7.63	196
Properties 1	11.66	9.13	213	Crymlyn Bog SAC	13.36	10.37	225
Properties 2	11.66	9.13	213	Gower Ash Woods SAC 1	6.26	5.07	151
Westfield Road	11.66	9.13	213	Gower Ash Woods SAC 2	7.28	5.88	163
Tir Y Farchnad	10.76	8.53	207	Gower Ash Woods SAC 3	7.90	6.34	171
Fairwood Terrace	10.76	8.53	207	Gower Ash Woods SAC 4	8.38	6.72	186
Swansea Road	12.76	9.95	220	Gower Commons SAC 1	6.35	5.15	153
Hospital	13.60	10.57	222	Gower Commons SAC 2	6.39	5.19	157
Caer'r-bont	12.31	9.61	218	Gower Commons SAC 3	6.91	5.59	159
Footpath 1	10.38	8.19	214	Gower Commons SAC 4	6.67	5.39	163
Footpath 2	10.38	8.19	214	Gower Commons SAC 5	8.77	7.02	188
Footpath 3	10.38	8.19	214	Killay Marsh LNR	10.98	8.70	194
				Priors Meadow LNR	8.04	6.46	180

Background deposition rates

The Air Pollution Information Service (APIS) website provides estimates of background deposition rates of nitrogen and sulphur. The background deposition rates for the ecological receptors considered in this study are detailed in Table 2.10.

Table 2.10 Background deposition rates

Receptor	Nitrogen deposition (kg N ha ⁻¹ y ⁻¹)	Acid deposition of nitrogen equivalents (keq ha ⁻¹ y ⁻¹)	Acid deposition of sulphur equivalents (keq ha ⁻¹ y ⁻¹)
Carmarthen Bay and Estuaries SAC	14.42	1.03	0.17
Crymlyn Bog SAC	11.48	0.82	0.15
Gower Ash Woods SAC 1	16.80	1.20	0.17
Gower Ash Woods SAC 2	23.24	1.66	0.19
Gower Ash Woods SAC 3	20.44	1.46	0.18
Gower Ash Woods SAC 4	20.44	1.46	0.18
Gower Commons SAC 1	11.48	0.82	0.15
Gower Commons SAC 2	11.48	0.82	0.15
Gower Commons SAC 3	11.48	0.82	0.15
Gower Commons SAC 4	11.62	0.83	0.15
Gower Commons SAC 5	13.30	0.95	0.15
Killay Marsh LNR	13.30	0.95	0.15
Priors Meadow LNR	23.24	1.66	0.19

Local Air Quality Management

The City and County of Swansea, under its Local Air Quality Management (LAQM) obligations, continually reviews and assesses concentrations of key air pollutants in the borough to ascertain the requirement, or otherwise, to declare an Air Quality Management Area (AQMA) (Swansea 2014). Following the review and assessments undertaken to date, the Council has declared an AQMA for annual mean NO₂ covering three parts of Swansea:

- ▶ along a section of the A483 near the junction with the A4216 at Fforest-fach Cross, approximately 2 km east of the Timet site;
- ▶ around the junction of the A4118 with the A4216 in Sketty, approximately 4 km south-east of the Timet site; and
- ▶ the Hafod district of central Swansea, approximately 5 km east of the Timet site.

The included receptors, particularly Keeper's Lodge Farm and Caer'r-bont, will bound the contribution from the site at the AQMAs.

Background concentrations and deposition rates used in the assessment

Annual mean background concentrations and deposition rates for the receptors have been derived from the data in Table 2.9 and Table 2.10. The annual average process contribution is added to the annual average background concentration to give a total concentration at each receptor location. This total concentration can then be compared against the relevant Air Quality Standard/Objective (AQS/O) and the likelihood of an exceedance determined.

It is not technically rigorous to add predicted short-term or percentile concentrations to ambient background concentrations, since peak contributions from different sources would not necessarily coincide at the same time or at the same location. Without hourly ambient background monitoring data available it is difficult to

make an assessment against the achievement or otherwise of the short-term assessment criteria. For the current assessment, conservative short-term ambient levels have been derived by applying a factor of two to the annual mean background data as per the recommendation in Environment Agency Horizontal Guidance H1 Annex F.

There are three other sources of emissions close to the site, namely Aleris Recycling, Timet UK Ltd and Green Frog Power 214 Ltd. Because of their proximity to the site (and to potentially sensitive receptors), they have been modelled explicitly and added to the background. The Aleris Recycling and Timet UK Ltd sources are listed on the Environment Agency's Pollution Inventory as releasing less than 100 t of NO_x per year each, and have been modelled using estimated stack characteristics and assuming a constant NO_x emission rate of 100 t/year.

Information on the Green Frog Power 214 Ltd installation was obtained from the operator to enable it to be modelled with the same level of accuracy as the subject of this assessment. The Green Frog Power 214 Ltd installation is a Short-Term Operating Reserve (STOR) facility, which is similar to the Capacity Mechanism plant in that it operates for short periods (a few hours per year, approximately 400 hours) when electricity demand exceeds generating capacity. For the purpose of calculating short-term concentrations, it has been assumed that both plants operate at the same time, so the maximum 1-hour concentration results include contributions from both sources.

2.12 Sensitivity analysis and uncertainty

Sensitivity analysis

Wherever possible, this assessment has used worst-case scenarios, which will exaggerate the impact of the emissions on the surrounding area, including emissions, operational profile, ambient concentrations, meteorology and surface roughness. This assessment has considered 5 years of meteorological data, with data reported from the year(s) predicting the highest ground-level concentrations at the nearest sensitive receptor for comparison with the AQS.

In addition, a specific sensitivity test has been run to assess the impact of the surface roughness parameter. For the 2010 met year, receptor concentrations have been calculated using roughness lengths of 0.2 m and 1.5 m in addition to the main 0.75 m used in the main assessment. The results are given in Table 2.11. This shows that, as expected, at the distances of interest, the increased mixing with larger roughness lengths reduces concentrations. Over the wide range of lengths used in the test, from 0.2 m (representative of pasture or the lower end of agricultural land) to 0.75 (representative of parkland, woodlands, villages, open suburbia) and 0.75 to 1.5 (representative of forests, cities, industrialised areas), the effect is typically up to about 20%. The difference tends to be slightly larger at greater distances from the source, although the correlation is not strong ($R^2 = 0.20$).

This demonstrates that while it is important to use a sensible value for roughness length (e.g. not to use 1.5 m in a rural area), staying within the range of recommended values for a land-use type will not have a large effect on the modelling results.

Table 2.11 Modelled NO_x concentrations for different roughness lengths

Receptor	Annual mean NO _x			% Difference from 0.75 m	
	0.2 m	0.75 m	1.5 m	0.2 m	1.5 m
Keepers Lodge Farm	2.44	2.45	2.40	0.3%	-1.4%
Properties 1	2.26	2.53	2.08	11.7%	-8.1%
Properties 2	1.13	1.14	1.07	1.0%	-5.1%
Westfield Road	0.88	1.04	0.77	17.9%	-12.0%
Tir Y Farchnad	0.41	0.42	0.39	3.9%	-3.8%
Fairwood Terrace	0.37	0.43	0.34	14.3%	-8.6%
Swansea Road	0.43	0.47	0.42	7.7%	-4.2%
Hospital	0.56	0.59	0.54	5.4%	-3.8%
Caer-r-bont	1.39	1.61	1.25	15.7%	-10.4%
Footpath 1	1.90	2.11	1.78	11.2%	-6.1%
Footpath 2	10.14	9.62	9.96	-5.1%	-1.8%
Footpath 3	13.63	13.67	12.95	0.3%	-5.0%
Carmarthen Bay SAC	0.13	0.15	0.12	15.6%	-7.7%
Crymlyn Bog	0.04	0.05	0.04	25.5%	-7.3%
Gower Ash Woods 1	0.01	0.01	0.01	14.8%	-13.1%
Gower Ash Woods 2	0.03	0.03	0.02	11.0%	-11.7%
Gower Ash Woods 3	0.03	0.03	0.03	9.7%	-7.9%
Gower Ash Woods 4	0.02	0.02	0.02	1.2%	1.0%
Gower Commons SAC 1	0.01	0.02	0.01	20.1%	-12.5%
Gower Commons SAC 2	0.02	0.02	0.01	25.2%	-10.8%
Gower Commons SAC 3	0.02	0.02	0.02	22.0%	-13.9%
Gower Commons SAC 4	0.02	0.02	0.02	9.3%	-6.6%
Gower Commons SAC 5	0.08	0.09	0.07	19.3%	-13.9%
Killay Marsh LNR	0.08	0.09	0.08	3.0%	-3.9%
Priors Meadow LNR	0.05	0.06	0.04	22.9%	-14.3%

Model uncertainty

Process emissions have been modelled under expected operation using the standard steady state algorithms in ADMS to determine the impact on local human receptors. In order to model atmospheric dispersion using standard Gaussian methods, the following assumptions have to be made and limitations accepted:

- ▶ Conservation of mass - the entire mass of emitted pollutant remains in the atmosphere and no allowance is made for loss due to chemical reactions or deposition processes (although the standard Gaussian model can be modified to include such processes, as is the case with ADMS). Portions of the plume reaching the ground are assumed to be dispersed back away from the ground by turbulent eddies (eddy reflection);
- ▶ Steady state emissions - emission rates are assumed to be constant and continuous over the time averaging period of interest; and
- ▶ Steady state meteorology - no variations in wind speed, direction or turbulent profiles occur during transport from the source to the receptor. This assumption is reasonable within a few kilometres of a source but may not be valid for receptor distances in the order of tens of kilometres. For example, for a receptor 50 km from a source and with a wind speed of 5 m s^{-1} it will take nearly three hours for the plume to travel this distance during which time many different processes may change (e.g., the sun may rise or set and clouds may form or dissipate affecting the turbulent profiles). For this reason, Gaussian models are practically limited to predicting concentrations within ~20 km of a source.

As a result of the above, and in combination with other factors, not least attempting to replicate stochastic processes (e.g., turbulence) by deterministic methods, dispersion modelling is inherently uncertain, but is nonetheless a useful tool in plume footprint visualisation and prediction of ground level concentrations. The use of dispersion models has been widely used in the UK for both regulatory and compliance purposes for a number of years and is an accepted approach for this type of assessment.

This assessment has incorporated a number of worst-case assumptions, as described above, which will result in an overestimation of the predicted ground level concentrations from the process. As a result of these worst-case assumptions, the predicted results should be considered the upper limit of model uncertainty for a scenario where the actual site impact is determined. Therefore, the actual predicted ground level concentrations would be expected to be lower than those reported in this assessment and, in some cases, significantly lower.

3. Assessment criteria

3.1 Relevant legislation and guidance

EU legislation

Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

Directive 2008/50/EC (the 'Directive'), which came into force in June 2008, consolidates existing EU-wide air quality legislation (with the exception of Directive 2004/107/EC) and provides a new regulatory framework for PM_{2.5}.

The Directive sets limits, or target levels, for selected pollutants that are to be achieved by specific dates and details procedures EU Member States should take in assessing ambient air quality. The limit and target levels relate to concentrations in ambient air. At Article 2(1), the Directive defines ambient air as:

"...outdoor air in the troposphere, excluding workplaces as defined by Directive 89/654/EEC where provisions concerning health and safety at work apply and to which members of the public do not have regular access."

In accordance with Article 2(1), Annex III, Part A, paragraph 2 details locations where compliance with the limit values does not need to be assessed:

"Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:

- a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;*
- b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and*
- c) on the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation."*

UK legislation

The Air Quality Standards Regulations 2010

The Air Quality Standards Regulations 2010 (the 'Regulations') came into force on the 11 June 2010 and transpose Directive 2008/50/EC into UK legislation. The Directive's limit values are transposed into the Regulations as 'Air Quality Standards' (AQS) with attainment dates in line with the Directive.

These standards are legally binding concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects of sensitive groups or on ecosystems.

Similar to Directive 2008/50/EC, the Regulations define ambient air as;

"...outdoor air in the troposphere, excluding workplaces where members of the public do not have regular access."

with direction provided in Schedule 1, Part 1, Paragraph 2 as to where compliance with the AQS' does not need to be assessed:

"Compliance with the limit values directed at the protection of human health does not need to be assessed at the following locations:

- a) any location situated within areas where members of the public do not have access and there is no fixed habitation;*
- b) on factory premises or at industrial locations to which all relevant provisions concerning health and safety at work apply; and*
- c) on the carriageway of roads and on the central reservation of roads except where there is normally pedestrian access to the central reservation."*

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000.

Central to the Air Quality Strategy are health-based criteria for certain air pollutants; these criteria are based on medical and scientific reports on how and at what concentration each pollutant affects human health. The objectives derived from these criteria are policy targets often expressed as a maximum ambient concentration not to be exceeded, without exception or with a permitted number of exceedances, within a specified timescale. At paragraph 22 of the 2007 Air Quality Strategy, the point is made that the objectives are:

"...a statement of policy intentions or policy targets. As such, there is no legal requirement to meet these objectives except where they mirror any equivalent legally binding limit values..."

The AQOs, based on a selection of the objectives in the Air Quality Strategy, were incorporated into UK legislation through the Air Quality Regulations 2000, as amended.

Paragraph 4(2) of The Air Quality (England) Regulations 2000 states:

"The achievement or likely achievement of an air quality objective prescribed by paragraph (1) shall be determined by reference to the quality of air at locations –

- a) which are situated outside of buildings or other natural or man-made structures above or below ground; and*
- b) where members of the public are regularly present."*

Consequently, compliance with the AQOs should focus on areas where members of the general public are present over the entire duration of the concentration averaging period specific to the relevant objective.

The Environment Act 1995

Part IV of the Environment Act 1995 requires that Local Authorities periodically review air quality within their individual areas. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's AQOs.

To carry out an air quality Review and Assessment under the LAQM process, the Government recommends a three-stage approach. This phased review process uses initial simple screening methods and progresses through to more detailed assessment methods of modelling and monitoring in areas identified to be at potential risk of exceeding the objectives in the Regulations.

Review and assessments of local air quality aim to identify areas where national policies to reduce vehicle and industrial emissions are unlikely to result in air quality meeting the Government's air quality objectives by the required dates.

For the purposes of determining the focus of Review and Assessment, Local Authorities should have regard to those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective.

Where the assessment indicates that some or all of the objectives may be potentially exceeded, the Local Authority has a duty to declare an AQMA. The declaration of an AQMA requires the Local Authority to implement an Air Quality Action Plan (AQAP), to reduce air pollution concentrations so that the required AQOs are met.

Other guideline values

In the absence of statutory standards for the other prescribed substances that may be found in the emissions, there are several sources of applicable air quality guidelines.

Air Quality Guidelines for Europe, the World Health Organisation (WHO)

The aim of the WHO Air Quality Guidelines for Europe (WHO, 2000) is to provide a basis for protecting public health from adverse effects of air pollutants and to eliminate or reduce exposure to those pollutants that are known or likely to be hazardous to human health or well-being. These guidelines are intended to provide guidance and information to international, national and local authorities making risk management decisions, particularly in setting air quality standards.

Environmental Assessment Levels (EALs)

The Environment Agency's Horizontal Guidance Note H1 provides methods for quantifying the environmental impacts of emissions to all media. H1 Annex F contains long and short-term Environmental Assessment Levels (EALs) and Environmental Quality Standards (EQS) for releases to air derived from a number of published UK and international sources. For the pollutants considered in this study, these EALs and EQS are equivalent to the AQS and AQOs set in force by the Air Quality Strategy for England, Scotland Wales and Northern Ireland.

The H1 guidance note includes an additional EAL of relevance to this assessment, namely a limit of $75 \mu\text{g m}^{-3}$ on daily mean NO_x at ecological receptors. This is based on guidance from the World Health Organization (WHO, 2000), which says:

“Experimental evidence exists that the CLE [critical level] decreases from around $200 \mu\text{g/m}^3$ to $75 \mu\text{g/m}^3$ when in combination with O_3 or SO_2 at or above their critical levels. In the knowledge that short-term episodes of elevated NO_x concentrations are generally combined with elevated concentrations of O_3 or SO_2 , $75 \mu\text{g/m}^3$ is proposed for the 24 h mean.”

3.2 Air quality impacts of the process

The atmospheric emissions of the following pollutants have been identified as requiring detailed dispersion modelling:

- ▶ Oxides of nitrogen (NO_x as NO_2); and
- ▶ Carbon monoxide (CO).

A brief description of each pollutant is given in Table 3.1.

Table 3.1 Summary of the pollutants assessed

Pollutant	Description and effect on human health and the environment	Principal Sources
Oxides of Nitrogen (NO_x)	Nitrogen dioxide (NO ₂) and Nitric oxide (NO) are both collectively referred to as oxides of Nitrogen (NO _x). It is NO ₂ that is associated with adverse effects on human health. Most atmospheric emissions are in the form of NO which is converted to NO ₂ in the atmosphere through reactions with Ozone. The oxidising properties of NO ₂ theoretically could damage lung tissue, and exposure to very high concentrations of NO ₂ can lead to inflammation of lung tissue, affect the ability to fight infection. The greatest impact of NO ₂ is on individuals with asthma or other respiratory conditions, but consistent impacts on these individuals is at levels of greater than 564 µg m ⁻³ , much higher than typical UK ambient concentrations.	All combustion processes produce NO _x emissions, and the principal source of NO _x is road transport, which accounted for 32% of total UK emissions in 2008. Emissions from power stations contributed a further 20%.
Carbon Monoxide (CO)	The toxicity of CO results in it binding avidly to haemoglobin and thus reducing the oxygen carrying capacity of the blood. In very high doses, the restriction of oxygen to the brain and heart can be fatal. At lower concentrations, CO can affect higher cerebral function, heart function and exercise capacity.	The principal source of CO is emissions from petrol vehicles, accounting for 54% of total UK emissions in 2008.

3.3 Criteria appropriate to the assessment

Air Quality Standards, Objectives, Guidelines and Critical Levels

Table 3.2 sets out those AQS, AQOs and EALs that are relevant to this assessment.

Table 3.2 Air Quality Standards, Objectives and Environmental Assessment Levels

Pollutant	AQS/AQO/EAL	Averaging Period	Value (µg m ⁻³)
NO ₂	AQS	Annual mean	40
	AQS	1-hour mean, not to be exceeded more than 18 times a year (equivalent of 99.79 Percentile)	200
NO _x : Ecological Receptors	AQS	Annual mean	30
	EAL	Daily mean	75
CO	AQS	8-hour mean	10,000
	EAL	1-hour mean	30,000

Critical Loads relevant to the assessment

The Air Pollution Information Service (APIS) contains information on applicable critical loads for various habitats and species.

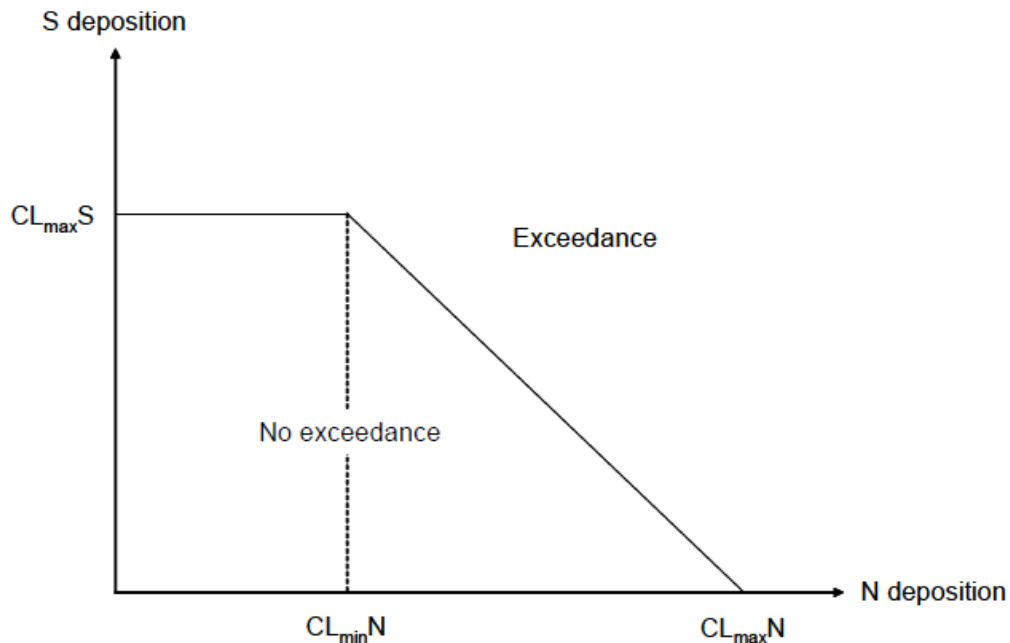
Eutrophication critical loads are given as a range and have units of kg N ha⁻¹ y⁻¹. Generally, the lower end of the range should be used as a conservative assessment. The critical loads for acidification are more complicated, in that both the nitrogen and sulphur deposition fluxes must be considered at the same time. Therefore, a critical load function is specified for acidification, via the use of three critical load parameters:

- ▶ CL_{maxS} — the maximum critical load of sulphur, above which the deposition of sulphur alone would be considered to lead to an exceedance;
- ▶ CL_{minN} — a measure of the ability of a system to "consume" deposited nitrogen (e.g. via immobilisation and uptake of the deposited nitrogen); and

- ▶ $CL_{max}N$ — the maximum critical load of acidifying nitrogen, above which the deposition of nitrogen alone would be considered to lead to an exceedance.

These three quantities define the critical load function shown in Figure 3.1.

Figure 3.1 Schematic Critical Load function for acidity



Source: Environment Agency (2011)

Information held on the APIS website has been reviewed in order to identify the main habitat/species features and their site relevant critical loads. Information is only available for the designated sites (i.e. SACs, SSSIs etc.), not for Local Nature Reserves with no other designation. Table 3.3 summarises this information.

Table 3.3 Relevant Critical Load data for the assessment

Designated sites	Main notified habitat/species features in the assessment area	Minimum nutrient nitrogen deposition critical load (kg N ha ⁻¹ y ⁻¹)	CLmaxS (keq ha ⁻¹ y ⁻¹)	CLminN (keq ha ⁻¹ y ⁻¹)	CLmaxN (keq ha ⁻¹ y ⁻¹)
Carmarthen Bay and Estuaries SAC	Atlantic salt meadows; Salicornia and other annuals colonizing mud and sand; Estuaries	20	N/A	N/A	N/A
Crymlyn Bog	Transition mires and quaking bogs	5	0.342	0.321	0.661
Gower Ash Woods SAC	Tilio-Acerion forests of slopes, screes and ravines	15	0.322	0.142	0.666
Gower Commons SAC	Euphydryas aurinia - Marsh fritillary butterfly; European dry heaths; Northern Atlantic wet heaths with Erica tetralix; Coenagrion mercuriale - Southern damselfly; Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) - Purple moor-grass meadows	10	0.16	0.223	0.526

3.4 Significance criteria

Although no formal procedure exists for classifying the magnitude and significance of air quality effects from a new development, guidance issued by Environmental Protection UK (2010) suggests ways to address the issue. In the EPUK guidance, the magnitude of impact due to an increase/decrease in annual mean NO₂ and PM₁₀ is described using the criteria in Table 3.4. These criteria are based on the change in concentration brought about by a new development as a percentage of the assessment level, or the equivalent mass basis. When describing the impact at a specific receptor, the actual concentration at that receptor should be taken into account, in combination with the magnitude of change, using the approach detailed in Table 3.5. It should be noted that an equivalent set of the descriptors in the EPUK guidance is available for those developments that would result in a decrease in concentrations. However, as the installation will increase the pollutant loading, only the 'Increase with Scheme' descriptors are given here.

Table 3.4 Definition of impact magnitude for changes in annual mean NO₂ and PM₁₀ concentration

Magnitude of change	Annual mean concentration
Large	Increase/decrease > 4 µg m ⁻³
Medium	Increase/decrease 2 – 4 µg m ⁻³
Small	Increase/decrease 0.4 – 2 µg m ⁻³
Imperceptible	Increase/decrease < 0.4 µg m ⁻³

Table 3.5 Impact descriptors for increases in annual mean NO₂ and PM₁₀ concentration

Absolute concentration in relation to objective	Increase in concentration		
	Small	Medium	Large
Above objective with scheme ($> 40 \mu\text{g m}^{-3}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just below objective with scheme ($36 - 40 \mu\text{g m}^{-3}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below objective with scheme ($30 - 36 \mu\text{g m}^{-3}$)	Negligible	Slight Adverse	Slight Adverse
Well below objective with scheme ($< 30 \mu\text{g m}^{-3}$)	Negligible	Negligible	Slight Adverse

Note: Those developments that have a magnitude of change classed as 'imperceptible' are considered to have a 'negligible' impact.

Public exposure

Guidance from the UK Government and Devolved Administrations makes clear that exceedances of the health based objectives should be assessed at outdoor locations where members of the general public are regularly present over the averaging time of the objective. As in Section 3.1, this also excludes workplaces. Table 3.6 provides an indication of those locations that may or may not be relevant for each averaging period.

Table 3.6 Examples of where the Air Quality Objectives should apply for human receptors

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties ¹ .	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

¹ For gardens, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is a seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

4. Assessment of impact

This section sets out the results of the dispersion modelling and compares predicted ground level concentrations against the assessment criteria detailed in Section 3. The predicted concentrations resulting from the process (i.e. the process contribution (PC)) are presented along with background concentrations and the percentage contribution that the predicted environmental concentrations (PEC) would make towards the relevant standard, objective or guideline value.

4.1 Meteorological data sensitivity analysis

As described in Section 2.3, results were calculated separately for five different years of meteorological data ('met year'). For each of the specific receptors and for each pollutant measure, the met year giving the highest concentration was determined, and the corresponding concentration is the one presented here. In other words, each of the individual results are the worst case for that measure. For plotting the concentration isopleths, a single met year was chosen, namely the year producing the highest annual mean NO₂ concentration at any point in the model domain. This means that some results in the tables of specific receptors will not accord exactly with the contour bandings on the figure (they will be higher in the tables).

4.2 Human health effects

Nitrogen dioxide (NO₂)

Predicted concentrations of annual mean NO₂ and the 99.79 percentile 1-hour mean NO₂ are given in Table 4.1. Contours of annual mean NO₂ are shown in Figure 4.1 and Figure 4.2 (for the near field and far field respectively), and contours of 99.79 percentile 1-hour mean NO₂ are shown in Figure 4.3 (for the near field only, since it is not relevant for ecological receptors).

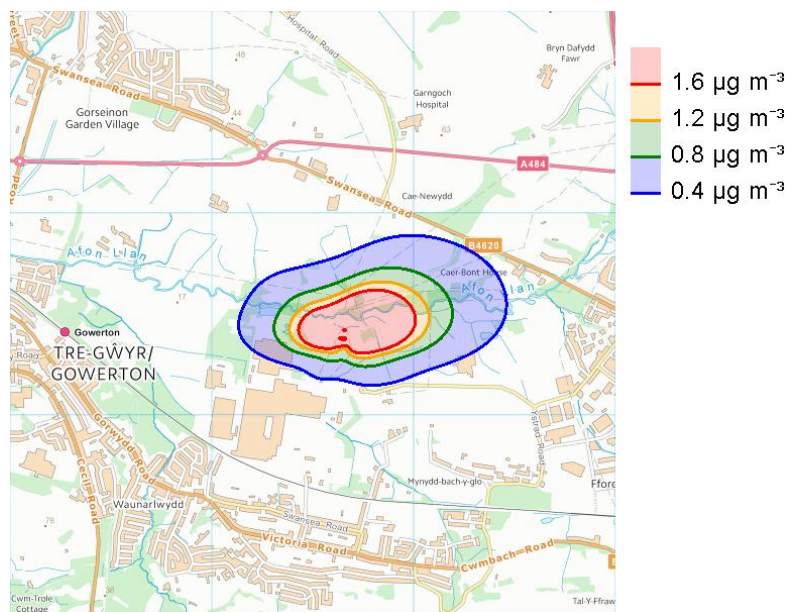
Table 4.1 Maximum PCs and PECs for NO₂

Receptor	Annual mean NO ₂				99.79 percentile 1-hour mean NO ₂			
	AQS (µg m ⁻³)	PC (µg m ⁻³)	PEC (µg m ⁻³)	% PEC of AQS	AQS (µg m ⁻³)	PC (µg m ⁻³)	PEC (µg m ⁻³)	% PEC of AQS
Keeper's Lodge Farm	40	0.48	10.39	26.0%	200	26.12	61.49	30.7%
Properties 1	40	0.37	9.73	24.3%	200	25.15	57.20	28.6%
Properties 2	40	0.19	9.43	23.6%	200	12.31	37.66	18.8%
Westfield Road	40	0.14	9.36	23.4%	200	11.64	36.41	18.2%
Tir Y Farchnad	40	0.09	8.67	21.7%	200	6.48	27.16	13.6%
Fairwood Terrace	40	0.07	8.64	21.6%	200	5.41	25.53	12.8%
Swansea Road	40	0.08	10.08	25.2%	200	6.90	30.36	15.2%
Hospital	40	0.10	10.73	26.8%	200	6.42	30.85	15.4%
Caer'r-bont	40	0.34	10.13	25.3%	200	11.85	37.30	18.6%
Footpath 1	40	---	---	---	200	18.95	44.74	22.4%
Footpath 2	40	---	---	---	200	74.30	121.83	60.9%
Footpath 3	40	---	---	---	200	66.74	112.18	56.1%

The maximum annual mean NO₂ PEC at any relevant human receptor location is predicted as 10.73 µg m⁻³ or 26.8% of the AQS at the Hospital receptor. (Note that the Footpath receptors are not relevant receptors for the annual mean.) The greatest change in concentrations from baseline levels is experienced at Keeper's Lodge, namely 0.48 µg m⁻³. Under the EPUK criteria, the magnitude of change at Keeper's Lodge is classed as 'small' and of 'negligible' impact. At all receptors, the impact is 'negligible'.

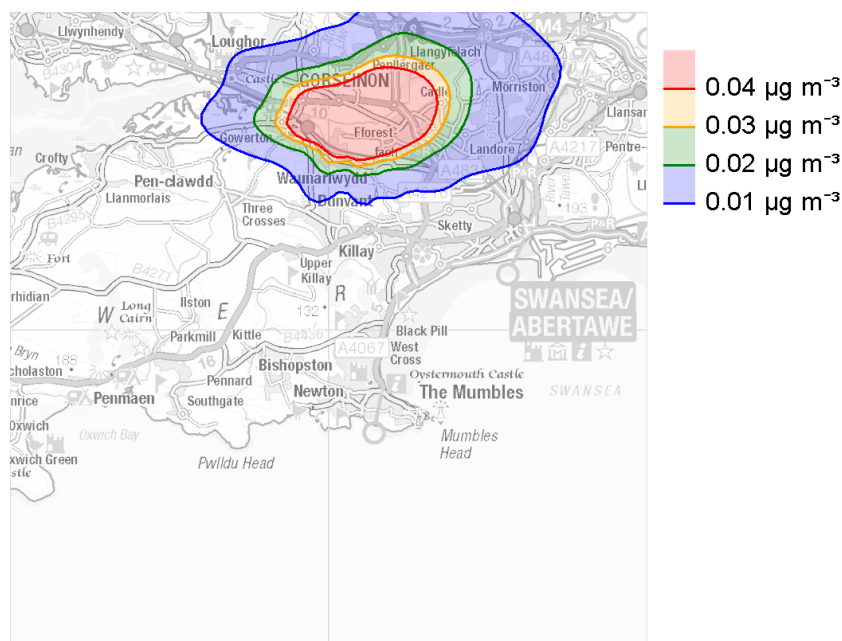
The maximum 99.79 percentile 1-hour mean NO₂ PEC at any relevant human receptor location is predicted as 121.83 µg m⁻³ or 60.9% of the AQS at the Footpath 2 receptor the closest point to the site.

Figure 4.1 NO₂ annual mean process contribution with 2011 meteorology — near field



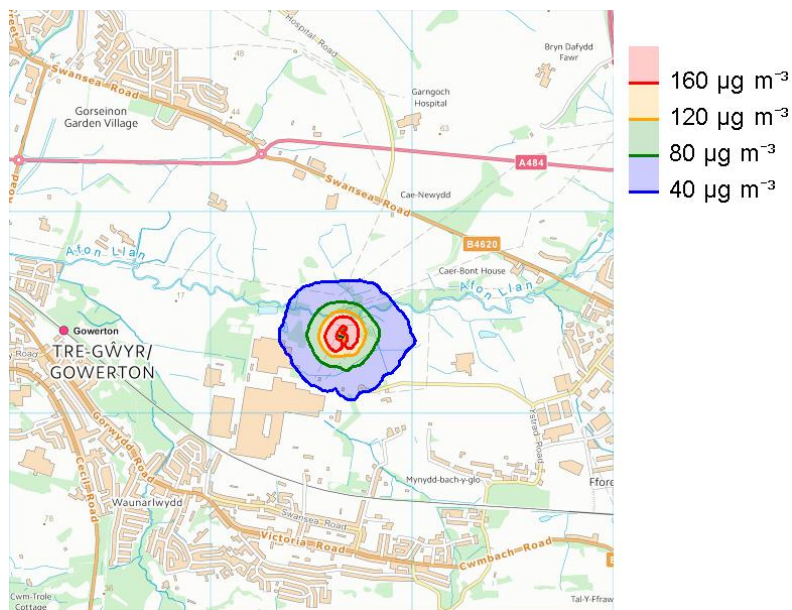
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Figure 4.2 NO₂ annual mean process contribution with 2011 meteorology — far field



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Figure 4.3 NO₂ 99.79 percentile 1-hour mean process contribution with 2011 meteorology — near field



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Carbon monoxide (CO)

Predicted concentrations of annual mean CO and the maximum rolling 88-hour mean CO are given in Table 4.2.

The maximum 1-hour mean CO PEC at any relevant human receptor location is predicted as 1180 $\mu\text{g m}^{-3}$ or 3.9% of the EAL at the Footpath 3 receptor. The maximum rolling 8-hour mean CO PEC at any relevant human receptor location is predicted as 743 $\mu\text{g m}^{-3}$ or 7.4% of the AQS at the Footpath 2 receptor. On this evidence, emissions of CO from the installation are likely to have a negligible impact on human health.

Table 4.2 Maximum PCs and PECs for CO

Receptor	Maximum 1-hour mean CO				Maximum rolling 8-hour mean CO			
	EAL ($\mu\text{g m}^{-3}$)	PC ($\mu\text{g m}^{-3}$)	PEC ($\mu\text{g m}^{-3}$)	% PEC of AQS	AQS ($\mu\text{g m}^{-3}$)	PC ($\mu\text{g m}^{-3}$)	PEC ($\mu\text{g m}^{-3}$)	% PEC of AQS
Keeper's Lodge Farm	30,000	158	743	2.5%	10,000	70	569	5.7%
Properties 1	30,000	170	741	2.5%	10,000	78	566	5.7%
Properties 2	30,000	118	650	2.2%	10,000	32	487	4.9%
Westfield Road	30,000	99	620	2.1%	10,000	23	470	4.7%
Tir Y Farchnad	30,000	65	540	1.8%	10,000	14	442	4.4%
Fairwood Terrace	30,000	60	524	1.7%	10,000	12	437	4.4%
Swansea Road	30,000	75	583	1.9%	10,000	34	506	5.1%
Hospital	30,000	120	674	2.2%	10,000	45	530	5.3%
Caer'r-bont	30,000	93	620	2.1%	10,000	27	488	4.9%
Footpath 1	30,000	133	671	2.2%	10,000	---	---	---
Footpath 2	30,000	383	1040	3.5%	10,000	---	---	---
Footpath 3	30,000	400	1180	3.9%	10,000	---	---	---

4.3 Ecological effects

Critical Levels

Table 4.3 and Table 4.4 present the assessment of predicted NO_x concentrations against established critical levels for the ecological receptors considered in this study.

Table 4.3 Critical Levels assessment of annual mean NO_x

Receptor	Annual mean NO _x			
	Critical Level ($\mu\text{g m}^{-3}$)	PC ($\mu\text{g m}^{-3}$)	PEC ($\mu\text{g m}^{-3}$)	% PEC of Critical Level
Carmarthen Bay and Estuaries SAC	30	0.03	9.62	32.1%
Crymlyn Bog	30	0.01	13.37	44.6%
Gower Ash Woods SAC 1	30	<0.01	6.26	20.9%
Gower Ash Woods SAC 2	30	0.01	7.29	24.3%
Gower Ash Woods SAC 3	30	0.01	7.91	26.4%
Gower Ash Woods SAC 4	30	<0.01	8.39	28.0%
Gower Commons SAC 1	30	<0.01	6.36	21.2%
Gower Commons SAC 2	30	<0.01	6.40	21.3%
Gower Commons SAC 3	30	<0.01	6.91	23.0%
Gower Commons SAC 4	30	<0.01	6.68	22.3%
Gower Commons SAC 5	30	0.02	8.79	29.3%
Killay Marsh LNR	30	0.02	11.01	36.7%
Priors Meadow LNR	30	0.01	8.05	26.8%

Table 4.4 Critical Levels assessment of daily mean NO_x

Receptor	Daily mean NO _x			
	Critical Level (µg m ⁻³)	PC (µg m ⁻³)	PEC (µg m ⁻³)	% PEC of Critical Level
Carmarthen Bay and Estuaries SAC	75	3.33	24.19	32.3%
Crymlyn Bog	75	1.68	29.30	39.1%
Gower Ash Woods SAC 1	75	0.86	13.84	18.5%
Gower Ash Woods SAC 2	75	1.44	16.79	22.4%
Gower Ash Woods SAC 3	75	1.33	17.85	23.8%
Gower Ash Woods SAC 4	75	1.46	19.04	25.4%
Gower Commons SAC 1	75	1.29	14.72	19.6%
Gower Commons SAC 2	75	1.97	15.83	21.1%
Gower Commons SAC 3	75	1.97	16.87	22.5%
Gower Commons SAC 4	75	0.94	14.79	19.7%
Gower Commons SAC 5	75	3.67	23.19	30.9%
Killay Marsh LNR	75	2.62	26.00	34.7%
Priors Meadow LNR	75	3.02	20.82	27.8%

Table 4.3 and Table 4.4 indicate that PECs are below their respective critical levels for all averaging periods and all receptors. In this regard, predicted concentrations at ecological receptors resulting from the installation are not expected to result in adverse effects at these locations.

Critical Loads

Nutrient nitrogen deposition rates at all of the ecological receptors modelled are predicted to be well below 0.01 kg N ha⁻¹ y⁻¹, and are nowhere more than 0.02% of the lower critical load of 5 kg N ha⁻¹ y⁻¹. These deposition rates would not be considered significant, even though most of the receptors are above their critical loads.

Table 4.5 Critical Loads assessment of nitrogen deposition

Receptor	Minimum Critical Load (kg N ha ⁻¹ y ⁻¹)	PC (kg N ha ⁻¹ y ⁻¹)	PEDR (kg N ha ⁻¹ y ⁻¹)	% PC of Critical Load	% PEC of Critical Load
Carmarthen Bay and Estuaries SAC	20	3.38×10^{-3}	14.42	0.02%	72.12%
Crymlyn Bog	5	9.43×10^{-4}	11.48	0.02%	229.62%
Gower Ash Woods SAC 1	15	2.66×10^{-4}	16.80	0.00%	112.00%
Gower Ash Woods SAC 2	15	6.28×10^{-4}	23.24	0.00%	154.94%
Gower Ash Woods SAC 3	15	7.02×10^{-4}	20.44	0.00%	136.27%
Gower Ash Woods SAC 4	15	5.02×10^{-4}	20.44	0.00%	136.27%
Gower Commons SAC 1	10	3.01×10^{-4}	11.48	0.00%	114.80%
Gower Commons SAC 2	10	3.72×10^{-4}	11.48	0.00%	114.80%
Gower Commons SAC 3	10	4.58×10^{-4}	11.48	0.00%	114.80%
Gower Commons SAC 4	10	4.84×10^{-4}	11.62	0.00%	116.20%
Gower Commons SAC 5	10	1.85×10^{-3}	13.30	0.02%	133.02%
Killay Marsh LNR	N/A	1.99×10^{-3}	13.30	N/A	N/A
Priors Meadow LNR	N/A	1.12×10^{-3}	23.24	N/A	N/A

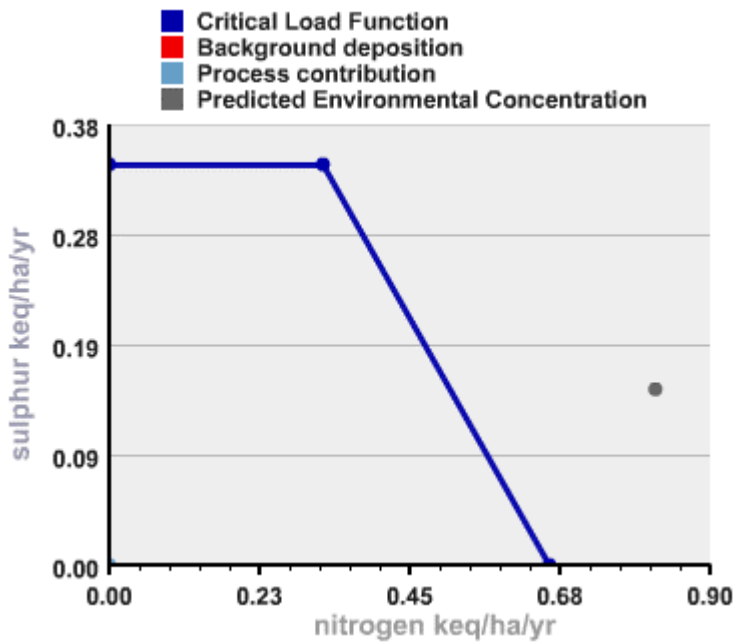
With respect to acid deposition, Table 4.6 gives an assessment of exceedances and Figure 4.4, Figure 4.5 and Figure 4.6 plot these values in relation to the acid deposition critical load function for three receptors from different SACs. Corresponding figures for the other receptors are similar. As with nitrogen deposition, the sites are at exceedance already due to background but the process contribution is tiny and would not be considered significant.

Table 4.6 Critical Loads assessment of acid deposition

Receptor	Exceedance (keq ha ⁻¹ y ⁻¹)			% of CL function		
	PC	Back-ground	PEC	PC	Back-ground	PEC
Crymlyn Bog	no exceedance of CL function	0.31	0.31	0%	146.7%	146.7%
Gower Ash Woods SAC 3	no exceedance of CL function	0.97	0.97	0%	246.2%	246.2%
Gower Commons SAC 5	no exceedance of CL function	0.57	0.57	0%	209.1%	209.1%

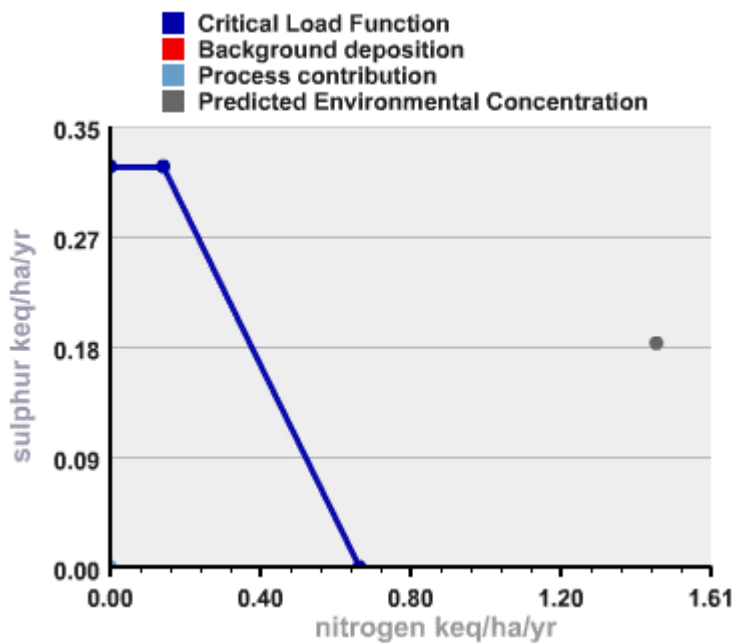
Source: <http://www.apis.ac.uk/critical-load-function-tool>

Figure 4.4 Assessment of acid deposition at the Crymlyn Bog receptor



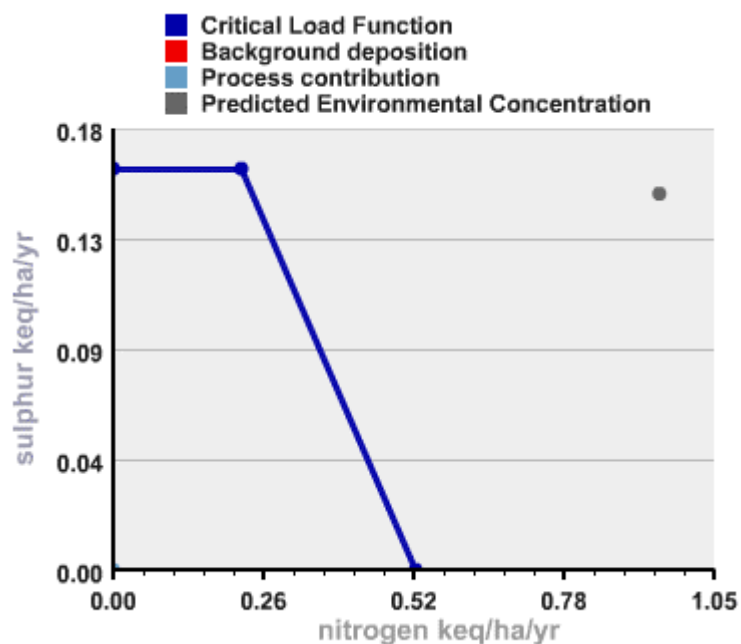
Source: <http://www.apis.ac.uk/critical-load-function-tool>

Figure 4.5 Assessment of acid deposition at the Gower Ash Woods SAC 3 receptor



Source: <http://www.apis.ac.uk/critical-load-function-tool>

Figure 4.6 Assessment of acid deposition at the Gower Commons SAC 5 receptor



Source: <http://www.apis.ac.uk/critical-load-function-tool>

Overall, nutrient nitrogen and deposition rates at ecological receptors resulting from emissions from the installation are not expected to have a significant impact on the integrity of the designated ecological features of the sites.

5. Conclusions

This assessment has used detailed dispersion modelling to undertake an impact assessment of emissions to air from the proposed Timet embedded power plant. The pollutants covered by the assessment are:

- ▶ Oxides of nitrogen (NO_x as NO₂); and
- ▶ Carbon monoxide (CO).

The plant will generate power under the Capacity Mechanism. This assessment assumes the engines operate for full, hourly periods to predict both the long-term and short-term impacts of engine emissions. Concentrations were calculated for each hourly period during the typical availability windows. This approach ensures that those meteorological conditions conducive to producing elevated ground level concentrations of pollutants are appropriately considered. However, given that the engines will only run for about 5 hours a day and about 1200 hours per year, additional post-processing of raw modelled output has been undertaken.

The impact assessment demonstrates that, under the anticipated operational profile of the plant, exceedances of any AQS, EAL, critical level or critical load are unlikely, or where exceedances are predicted due to the existing baseline concentration or deposition rate, the additional contribution from the plant is not considered to be significant. In addition, the impacts at human receptor locations can be defined as 'negligible' following the guidance issued by Environmental Protection UK. On this basis, air quality factors should not be considered a constraint to development of the site for Capacity Mechanism purposes.

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Appendix D

Ecology Assessment

GF Energy

Timet Capacity Mechanism Development

Ecological Appraisal



May 2015

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

David Sheppard
Green Frog Energy
17 The Courtyard
Gorsey Lane
Coleshill
Birmingham
B46 1JA

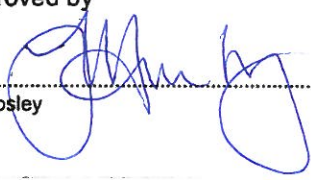
Main contributors

Gemma Mantle

Issued by


.....
Gemma Mantle

Approved by


.....
Jo Mosley**Amec Foster Wheeler**

155 Aztec West, Park Avenue, Almondsbury,
Bristol BS32 4UB, United Kingdom
Tel +44 (0) 1454 822 000
Fax +44 (0) 1454 822 010

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Document revisions

No.	Details	Date
1	Final	May 2015

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1. Introduction

1.1 Background and Site Context

Amec Foster Wheeler Environment & Infrastructure UK Ltd, hereafter referred to as Amec Foster Wheeler, was commissioned by G F Energy Group to carry out an Ecological Appraisal on land at the outskirts of Swansea, off Titanium Road, (National Grid Reference SS606963).

The site, as shown in **Figure 1.1**, is approximately 0.6ha in size and is located within agricultural land. Small energy generation compounds are present to the east and north of the site (one Western Power Distribution and a second owned by G F Energy Group), with further industrial land uses to the west and south separated from the site by grazing and arable fields.

1.2 Scheme Description

The proposed development is for a gas-fuelled capacity mechanism embedded power plant, which would comprise a series of gas-powered generators operating on a short term basis to meet peak capacity in the electricity distribution network i.e. they are a supplementary form of power which provide back-up supplies during potential black-out periods or when demand outstrips supply.

Site construction, laying of underground services and preparation of the foundations and slabs for the generators would take roughly three months, with a further three to four months required for the delivery and installation of the generators. These would arrive on a lorry and be craned off into the appropriate location prior to connection to utilities.

The power plant would not be continuously manned, with maintenance visits likely to occur a few times each week. The site would be surrounded by a 2.4m high metal security fence and within this fence would be a 3.5m high acoustic fenced compound to minimise noise arising from operation of the plant.

1.3 Purpose of the Report

The purpose of this report is to provide an ecological appraisal of the proposed works.

In accordance with standard good practice (Institute of Environmental Assessment (IEA), 1995 and Institute of Ecology and Environmental Management (IEEM), 2006) the appraisal comprises a desk-based study and field surveys of the site. Section 2 of this report details the desk study and field survey methods whilst Section 3 presents the results of these tasks. Section 4 identifies biodiversity receptors for the appraisal and Section 5 details the environmental measures included within the scheme design. Section 6 presents a summary of the report and any recommendations. A summary of pertinent legislation is provided in **Appendix A**.



Key



Site location

Green Frog Energy Group
Planning Support



Figure 1.1
Site location

0 km 3 km

Scale 1:50,000 @ A4

2. Methodology

2.1 Desk Study

A data gathering exercise was undertaken to obtain information relating to statutory and non-statutory nature conservation sites and/or records of species¹ that are afforded legal protection or are otherwise notable (see **Boxes 2.1 and 2.2**) within a 1km radius centred on the site. The search area was limited to 1km as it is unlikely that the proposed development would exert ecological impacts across a wider area, based on their small scale both during construction and operation². The following sources of information were consulted:

Multi Agency Geographic Information for the Countryside (MAGIC) at www.magic.gov.uk;

Swansea City and County Council; and

South East Wales Biodiversity Records Centre (SEWBRc).

The contextual information obtained as a result of the desk study is important as it may indicate the presence of, or the potential for, protected and notable species that could occur on the site itself, and indicate potential off-site factors that may influence constraints to development at the site.

Online mapping tools were also used to search for ponds and waterbodies within 500m of the works footprint in order to identify suitable potential great crested newt breeding sites, which are not separated from the site by significant barriers to dispersal, such as major roads or rivers.

¹ Only species records from the past 15 years were requested from consultees to reflect current species populations within the local area.

² The Air Quality Impact Assessment (Amec Foster Wheeler, 2015) supporting the application has assessed ecological receptors based on the Environment Agency's Horizontal Guidance Note H1Annex F which focuses on statutory designated sites within a certain distance from development. The assessment concludes that negligible increases in NO_x critical levels and the critical load of nitrogen and acid deposition at statutory designated sites would occur.

Box 2.1 Designated biodiversity sites, and priority habitats and species**Statutory biodiversity sites**

Internationally important sites (collectively referred to in this report as European sites – whilst recognising that Ramsar sites are designated at a global level): Special Area of Conservation (SACs), candidate SACs, Sites of Community Importance (SCIs), Special Protection Areas (SPAs), listed or proposed Ramsar sites, potential SPAs, possible/proposed SACs and sites identified or required as compensatory measures for adverse effects on other European sites

Nationally important sites: Sites of Special Scientific Interest (SSSIs) that are not European sites; also National Nature Reserves (NNRs)

Local Nature Reserves (LNRs) are statutory sites that are of importance for recreation and education as well as biodiversity. Their level of importance is defined by their other statutory or any non-statutory designations (e.g. if an LNR is also an SSSI but is not a European site, it will be of national importance). If an LNR has no other statutory or non-statutory designation it should be treated as being of borough/district-level importance for biodiversity (although it may be of greater socio-economic value).

Non-statutory nature conservation sites

Sites of county importance: Non-statutory nature conservation sites in Swansea are notified as Sites of Importance for Nature Conservation (SINCs).

Priority habitats and species

In this report, the geographic level at which a species/habitat has been identified as a priority for biodiversity conservation is referred to as its level of 'species/habitat importance'. For example, habitats and species of principal importance for the conservation of biological diversity in Wales are identified as of national species/habitat importance reflecting the fact that the importance of these species/habitats has been defined at a national level. The level of importance pertains to the species/habitat as a whole rather than to individual areas of habitat or species populations, which cannot be objectively valued (other than for waterfowl, for which thresholds have been defined for national/international population importance).

- International importance: populations of species or areas of habitat for which European sites are designated;
- International importance: populations of birds meeting the threshold for European importance (1% of the relevant international population).
- National importance: Priority habitats and species of principal importance for the conservation of biological diversity in Wales. These are listed on: <http://www.biodiversitywales.org.uk/49/en-GB/Section-42-Lists>.
- National importance: Species listed as being of conservation concern in the relevant UK Red Data Book (RDB) or the Birds of Conservation Concern Red List³.
- National importance: Nationally Rare and Nationally Scarce species, which are species recorded from, respectively, 1-15 and 16-100 hectads (10x10km squares of the Great Britain national grid).
- National importance: Populations of birds comprising at least 1% of the relevant British breeding/wintering population (where data are available).
- County importance: Habitats and species listed in the Swansea LBAP.

³ Eaton M.A., Brown A.F., Noble D.G., Musgrove A.J., Hearn R., Aebischer N.J. Gibbons D.W., Evans A. and Gregory R.D. (2009). Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* 102, pp296-341.

Box 2.2 Legally protected and controlled species**Legal protection**

Many species of animal and plant receive some degree of legal protection. For the purposes of this ES, legal protection refers to:

- Species included on Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended), excluding:
 - species that are only protected in relation to their sale (see Section 9[5] and 13[2]), given that the proposed development does not include any proposals relating to the sale of species, and
 - species that are listed on Schedule 1 but that are not likely to breed on or near the site, given that this schedule is only applicable whilst birds are breeding;
- Species included on Schedules 2 and 5 of the *Habitats Regulations 2010* (as amended);
- Badgers, which are protected under the *Protection of Badgers Act 1992*; and
- Hedgerows, some of which are protected under *The Hedgerow Regulations 1997*.

Legal control

Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) lists species of animal that it is an offence to release or allow to escape into the wild and species of plant that it is an offence to plant or otherwise cause to grow in the wild.

2.2 Extended Phase 1 Habitat Survey

An Extended Phase 1 Habitat Survey was carried out by Amec Foster Wheeler ecologist Gemma Mantle in April 2015. During this survey, distinct habitats were identified and mapped and any features of biodiversity interest were subject to a more detailed description in a target note, if required. As the standard Phase 1 Habitat Survey methodology⁴ is, in the main, concerned only with vegetation communities, the survey was extended⁵ to allow for the provision of information on other important ecological features, particularly to identify the presence/potential presence of legally protected species, such as bats, badgers and reptiles.

⁴ Joint Nature Conservation Committee (1993) Handbook for Phase 1 Habitat Survey. JNCC, Peterborough.

⁵ Institute of Environmental Assessment (1995) Guidelines for Baseline Ecological Assessment. E&FN Spon, London.

3. Results

3.1 Desk Study

Designated sites

There are no statutory designated sites within 1km of the site.

One non-statutory designated site of local importance is present adjacent to the proposed development with a further five SINC's present within 1km of the site. These are detailed in **Table 3.1** and the location of the SINC's relative to the site is shown in a reproduction of the plan provided by Swansea City Council in **Appendix B**.

Table 3.1 Non-statutory designated sites

Site name	Central OS grid reference	Distance from site	Reason for designation
Penyfodau Fawr to Llewitha SINC	SS609964	Adjacent	A large site (73ha) supporting a wide range of predominantly wetland habitats including fen, rush pasture and wet woodland, with species-rich meadows and scrub also present. A number of notable bird and invertebrate species occur including kingfisher, bullfinch, cinnabar and beautiful demoiselle.
Main Swansea – Fishguard Railway Line	SS666:960	250m South	This linear site comprises small pockets of semi-natural habitat adjacent to the mainline railway, including deciduous woodland, scrub, species-rich meadow, rush pasture and heathland.
Mynydd Back-Y-Glo	SS612956	550m South	The site comprises a mosaic of species-rich rush pasture, fen, scrub, bracken and woodland supporting notable bird species such as song thrush, bullfinch, house sparrow and reed bunting.
Alcoa Wet Meadows	SS596963	650m East	The SINC supports predominantly a mosaic of marshy grassland and wet woodland with species-rich scrub and meadows also present. These habitats support a number of notable bird and invertebrate species including song thrush, woodcock and white ermine.
Mynydd Gamgoch Common	SS610973	700m North	This large SINC (125ha) supports a complex mosaic of rush pasture, wet and dry heath, fen, reedbed, species-rich grassland, bracken and scrub and deciduous woodland.
Gowerton Mart Woods	SS596960	900m South-west	The SINC supports approximately 8ha of wet woodland providing habitat to notable bird species such as marsh tit and song thrush.

Table notes use Body Small text style

Legally protected and notable species

A wide range of protected and notable species have been recorded within 1km of the development site as anecdotal records or via formal survey, although SEWBRc returned no records from the site itself. These records have been reviewed and those pertinent to the site location and/or the works proposed are summarised in **Table 3.2**.

Table 3.2 Summary of pertinent protected and notable species records

Species/ Species group	Protected		Priority	Description of records held
	European	National		
Bats	✓	✓	✓	Four records around 800m to the south of the site, with common and soprano pipistrelle and noctule present. Lesser horseshoe bat has been recorded roosting over 2km from the site.
Notable birds		✓	✓	A total of 12 species have been recorded (including waders, and passerines), including one which is listed on Schedule 1 of the Wildlife and Countryside Act (barn owl, two records 800m south of the site).
Otter	✓	✓	✓	Two records, one of which is 750m south east of the site on an unnamed watercourse and the second 1km to the west of the site on the Afon Llan
Reptiles		✓	✓	A total of 14 combined records of common lizard and grass snake from locations 700m-900m south of the site.

There are also records of invasive species listed on Schedule 9 of the Wildlife and Countryside Act within 1km of the site. These comprise 14 records of Japanese knotweed and one record each of Himalayan cotoneaster, rhododendron and three-cornered garlic, with the closest record of Japanese knotweed approximately 700m to the south of the site.

Ponds

Six ponds were identified within 500m of the site from the Ordnance Survey (OS) basemapping. These are detailed in **Table 3.3**.

Table 3.3 Pond descriptions

Pond Number	Grid Ref	Distance from site	Description
1	SS605962	120m	Moderate sized, man-made pond approximately 20m by 10m in size, likely to be deep and with an island in the centre. The pond is surrounded by marshy grassland with rushes around the margin. Pondweeds are frequent and cover approximately 50% of the surface water. The Habitat Suitability Index (HSI) ⁶ for this pond has been calculated at 0.71 (good).
2	SS607963	120m	Small on-line waterbody, little more than a widening of the ditch, and dry at the time of survey.
3	SS607963	100m	Dry and does not appear to regularly hold water.
4	SS607964	100m	Dry and does not appear to regularly hold water.

⁶ Based on the method described in the ARG UK Advice Note 5 (2010).

Pond Number	Grid Ref	Distance from site	Description
5	SS603964	235m	Not accessed.
6	SS602965	330m	Not accessed. OS basemap labels as reservoir and therefore unlikely to be suitable for great crested newts.

Of the ponds identified three were found to be dry and Pond 6 is unlikely to be suitable for great crested newts. Whilst Pond 5 may provide suitable habitat for newts, given the distance (towards the upper end of distances generally travelled by great crested newts⁷) and good terrestrial habitat between the pond and the site (woodland and rough grassland), it is unlikely, even if present, newts would travel to the site, which provides limited habitat for newts and would at most be used transitionally. On the same basis, although Pond 1 provides good habitat for great crested newts, it is surrounded by very good terrestrial habitat and refugia/hibernacula (within the marshy grassland and hedgerow boundaries), therefore it is unlikely, even if present, that newts would occur within the site.

3.2 Extended Phase 1 Habitat Survey

Habitats

The results of the Phase 1 habitat survey are illustrated in **Figure 3.1**.

Onsite habitats

The red line boundary is located wholly within an agricultural field that is currently in silage production and is dominated by perennial rye-grass. There is limited species diversity within the sward, restricted to white clover, nettle, creeping buttercup and broad-leaved dock mainly around the field margins.

The remainder of the field, outside of the site boundary, is also perennial rye-grass dominated and species-poor. The field boundaries, also outside of the red line boundary, comprise defunct hedgerows with mature trees and support species including ash, pedunculate oak, hazel, European gorse and blackthorn with occasional bluebell in the ground flora.

Offsite habitats

The access route to the proposed development area utilises an existing track, which to the east of the site passes between two small areas of dense scrub surrounded by mature broad-leaved trees. The scrub is dominated by bramble, whilst a range of tree species occur, including beech, sycamore and downy birch. To the north of the track is a large spoil/rubble mound which has been colonised with poor semi-improved grassland and ruderal species with scattered buddleia. The ground flora in these areas is generally species-poor with common dog-violet, lesser celandine, cock's-foot and broad-leaved dock.

To the north of the redline boundary (between the site and the WPD compound) is a depression supporting poor semi-improved grassland, with patches of more diverse semi-improved damp grassland, and scrub associated with a dry ditch. Scrub species include blackthorn, hawthorn, downy birch and goat willow, with the grassland supporting soft rush, meadow foxtail, cuckooflower, water mint and spear thistle. There was evidence of cattle grazing in this area.

To the south of the site beyond the arable field are cattle-grazed fields supporting marshy grassland.

All of the off-site habitats described above are located within Penyfodau Fawr to Llewitha SINC.

⁷ English Nature Research Reports (Number 576): An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt *Triturus cristatus* (2004).

Species

Nesting birds

The site currently provides unsuitable habitat for either tree/shrub or ground nesting birds due to the lack of habitat present. However, once the silage crop is removed and/or replaced with an alternative agricultural crop or use, the potential for ground nesting birds may arise. Given the size of the site and likely potential future habitat, only small numbers of common species are would be likely to breed.

Bats

There is no suitable bat roosting habitat within the site and it provides very limited foraging opportunities. It is also very unlikely to form part of an important commuting route due to the absence of linear features.

The mature trees located adjacent to the access route and in the field boundaries have potential to support roosts due to their age and presence of suitable features such as natural cracks and crevices.

Reptiles

The site does not provide suitable habitat for reptiles.

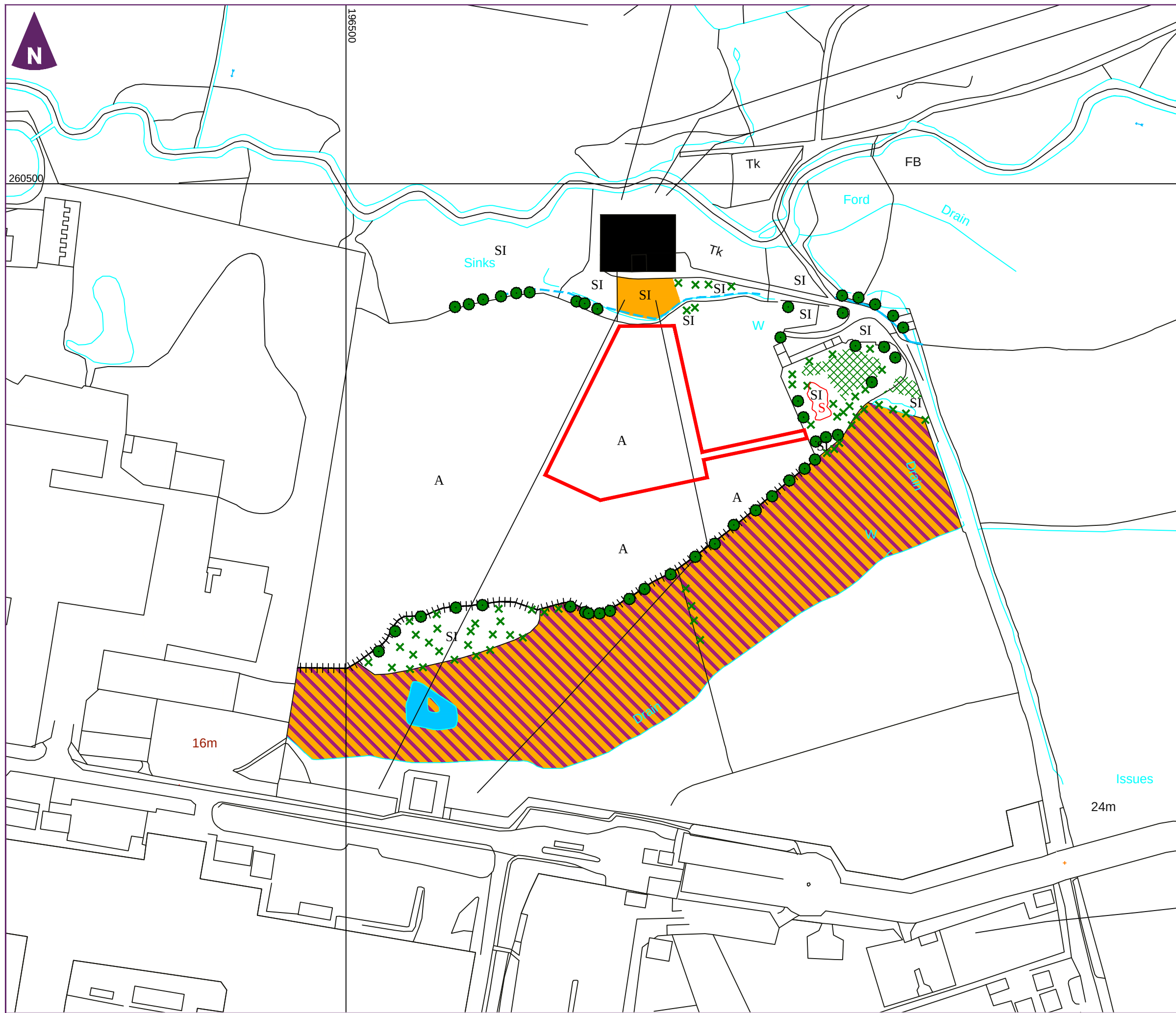
However, suitable reptile habitat does occur immediately adjacent to the site in areas of scrub and grassland to the north of the redline boundary and along the access route. These areas provide refugia/hibernacula (particularly the spoil/rubble mound and hedgerow bases) and south-facing banks for basking. Given the habitats present, it is possible common reptile species, i.e. grass snake, common lizard and slow-worm, may occur adjacent to the site.

Great crested newts

As described above, due to the distance between the site and the identified ponds, the suitable terrestrial habitats around the ponds and the low quality habitat within the site, there is negligible potential for great crested newts to occur within the red line boundary.

Otter

The site provides no suitable habitat for otter and the Afon Llan is approximately 70m to the north. Whilst the areas of dense scrub adjacent to the site provide potentially suitable habitat for resting otters, they are unlikely to be used frequently due to disturbance from farming and maintenance of the existing compounds.



- Key
- Site boundary
 - Dense scrub
 - Scattered scrub
 - Broad-leaved scattered trees
 - SI Semi-improved neutral grassland
 - Marsh/marshy grassland
 - SI Poor semi-improved grassland
 - Standing water
 - Running water
 - Dry ditch
 - S Spoil
 - A Arable
 - Fence
 - Building

0 m 100 m
Scale 1:2000 @ A3

Green Frog Energy Group
Planning Support

amec
foster
wheeler

Figure 3.1
Phase 1 Habitat Plan

4. Identification of Biodiversity Receptors

4.1 Methodology

The starting point for the assessment was to undertake a scoping exercise, using the baseline data that were collected through the desk study and field surveys, to subdivide the recorded biodiversity receptors (i.e. designated sites, together with species populations and habitats) into:

- ▶ Those that could be significantly affected by the proposed development or for which the development could result in the contravention of relevant legislation, and that therefore required more detailed assessment; and
- ▶ Those that were assessed as not being likely either to be significantly affected or for relevant legislation to be contravened, and that did not therefore require further assessment (i.e. that were 'scoped out' of the assessment).

The first stage of the approach that was used for differentiating these receptors involved determining:

- ▶ which, if any, of the species that have been recorded are legally protected or controlled (see **Box 2.2**); and/or
- ▶ Which, if any, sites, areas of habitat and species that have been recorded are of importance for biodiversity conservation, notwithstanding any legal protection that they may have (see **Box 2.1**).

For sites/habitats/species that are important for biodiversity conservation, the next stage of the scoping assessment was to determine whether the identified receptors are likely to be of sufficient 'biodiversity conservation value' that an effect upon them could be significant. In this context:

- ▶ Biodiversity conservation value relates to the quality and/or size of sites or habitats, or the size of species populations (see **Box 4.1**); and
- ▶ Potential significance means that the effect could be of sufficient concern, or for positive effects, of such substantial benefit, that it could influence the decision about whether or not planning permission should be granted.

Box 4.1. Value and importance for biodiversity conservation

The distinction between importance and value can be illustrated by common species such as the house sparrow. This species is important at a national level because it is a priority species (Section 42, NERC Act 2006). However, a small population that could be affected by a development would often be assessed as being of insufficient value for an effect (whether adverse or beneficial) to be of potential significance. On this basis it would not need to be assessed further (i.e. it would be 'scoped out' of the assessment).

Receptors that are of sufficient value that an effect upon them would have the potential to be significant, together with all relevant legally protected species, were then taken through to the next stage of the scoping assessment.

This involved:

- ▶ Identifying, for each receptor, any environmental changes that are likely to be caused by the proposed development, which have the potential to lead to a significant effect and/or to contravene relevant legislation;
- ▶ For these environmental changes, determining the area within which each change could cause a likely significant effect on each relevant receptor and/or could contravene relevant legislation (i.e. an 'ecological zone of influence');
- ▶ Comparing the area where the receptor occurs with the ecological zone of influence, recognising that the receptor may be wholly or partly associated with an area located outside of

the site of the proposed development (e.g. where a species breeds off site but its foraging area includes the site or off-site areas that would be affected by the proposed development); and

- ▶ If the receptor occurs or is likely to occur within the zone of influence, concluding that
- ▶ Either the receptor could be subject to a significant effect and/or the relevant legislation could be contravened - with the result that the receptor has been taken forward in the assessment;
- ▶ Or, if the environmental changes that could affect the receptor are insufficient for there to be a likely significant effect (allowing for cumulative effects), the receptor has been scoped out of the assessment.

4.2 Biodiversity Receptors

Using the approach described above led to the identification of the biodiversity receptors that are listed in **Table 4.1**, together with the rationale for their inclusion within the assessment. This rationale includes:

- ▶ The relevant category of value in relation to the above criteria i.e. biodiversity conservation value, or legal status⁸;
- ▶ The justification for their inclusion in the relevant category/ categories - for biodiversity conservation value this is derived from **Box 2.1** (with the relevant level of importance, as defined in **Box 2.1**, also being included), and for legal status it is derived from **Box 2.2**; and
- ▶ The pathway by which an effect could occur (e.g. habitat loss, lighting, noise etc.).

Table 4.1 Biodiversity receptors potentially affected by the scheme

Biodiversity Receptor	Category of Value	Level of Importance	Effect Pathway
Penyfodau Fawr to Llewitha SINC	Biodiversity importance	County	Potential for indirect effects on habitats within the SINC as a result of deposition or pollution incidents during construction and operation.
Breeding birds	Legal protection	All birds receive UK protection while breeding and certain species are protected by special penalties at all times.	Low potential for destruction of active nests during construction (dependant on habitat present at the time of site preparation).
Bats	Legal protection	European protected species	Increased lighting during construction (if required) may have a detrimental effect on commuting and foraging bats using boundary features outside the site.

All other biodiversity receptors, including the remaining non-statutory designated sites within 1km of the development, have been scoped out of the assessment, either because the population or area likely to be affected by the development is of insufficient size to be of biodiversity value or because no potential impact pathway between the development and these receptors has been identified.

⁸ Legal status is used in this report to refer to legally protected and controlled species.

5. Environmental measures and residual effects

5.1 Environmental measures

Potential effects on the biodiversity receptors identified in Section 4 would be avoided and/or reduced through the inclusion of environmental measures within the scheme design and construction phase. These are described in **Table 5.1** with an explanation of how the measure would change the effect pathway.

Table 5.1 Environmental measures

Ref.	Measure	Receptor targeted	How effects on biodiversity are minimised or provide enhancement
Scheme design			
1	Proposed development located on agricultural land	All	The development has been located outside of designated sites and in an area of agricultural land of very low biodiversity value, thereby reducing the potential for adverse effects on protected and notable habitats and species.
Construction method			
2	Sensitive construction methods	All	Prior to commencement of works a tool box talk would be provided by a suitably qualified ecologist. This would highlight the best practice measures that should be implemented and the procedure should protected species be found during the course of the construction works.
3	Vegetation clearance would be programmed to occur outside of the breeding bird season (which is March to August inclusive) if required	Breeding birds	Based on the vegetation currently present at the site, the likelihood of active nests being present is very low and no restriction on vegetation clearance would be necessary. However, if site establishment commences between March and August and the field is in a different agricultural use (e.g. in future years), the potential for active nests should be reassessed. If a risk to breeding birds is identified, a further survey to determine whether any active nests are present will be required and any works must be supervised by a suitably qualified ecologist. Should active nests be present, it is likely that works will be restricted until dependent young have fledged.
4	Construction to occur only during daylight hours	Bats	Restricting works to daylight hours reduces the requirement for site lighting and minimises effects on light sensitive species such as bats. If work or security lighting is required during the hours of darkness, guidance within the publication <i>Artificial lighting and wildlife - Interim Guidance: Recommendations to help minimise the impact of artificial lighting</i> provided by the Bat Conservation Trust (BCT, 2014) should be adopted.
6	Implementation of EA Pollution Prevention Guidelines (PPGs) and dust suppression methods during construction	All	Adoption of best practice working methods will minimise the risk of pollution events occurring and dust deposition on adjacent designated habitats.

5.2 Residual effects

No residual effects on biodiversity receptors have been identified.

6. Summary and Recommendations

6.1 Summary

The site comprises a species-poor agricultural field in silage production with very limited potential to support protected or notable species and is of very low biodiversity value. Adjacent habitats are more species-diverse and comprise marshy grassland, scrub, woodland and hedgerows with potential to support reptiles and bats, and which form part of Penyfodau Fawr to Llewitha SINC. Further SINC's occur within 1km of the proposed development and all of have been designated for habitat mosaics of rush pasture, scrub, woodland and meadows.

Potential effect pathways have been identified in relation to Penyfodau Fawr to Llewitha SINC, bats and reptiles. However, potentially negative effects on these biodiversity receptors would be avoided and/or minimised through the adoption of various environmental measures, which seek to minimise the working footprint and disturbance arising from construction. These measures will also ensure legal compliance.

6.2 Recommendations

In order to ensure that effects on biodiversity are minimised the environmental measures detailed in **Table 5.1** should be adhered to. If this is not possible an ecologist should be consulted to assess the effect of any changes on biodiversity.

As per **Table 5.1** it is recommended that contractors are provided with an ecological toolbox talk prior to commencement.

Appendix A

Legislation

Birds

With certain exceptions⁹, all wild birds, their nests and eggs are protected by section 1 of the Wildlife and Countryside Act 1981 (as amended). Therefore, it is an offence, inter alia, to:

- ▶ Intentionally kill, injure or take any wild bird;
Intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- ▶ Intentionally take or destroy the egg of any wild bird.

These offences do not apply to hunting of birds listed in Schedule 2 of the Act subject to various controls.

Bird species listed on Schedule 1 of the Act receive further protection, thus for these species it is also an offence to:

- ▶ Intentionally or recklessly disturb any bird while it is nest building, or is at a nest containing eggs or young; or
- ▶ Intentionally or recklessly disturb the dependent young of any such bird.
- ▶ For golden eagle, white-tailed eagle and osprey, it is also an offence to:
- ▶ Take, damage or destroy the nest of these species (this applies at any time, not only when the nest is in use or being built).

Bats (*Rhinolophidae* and *Vespertilionidae*)

All British bat species are listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). They are afforded full protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, inter alia, to:

- ▶ Deliberately capture, injure or kill a bat;
- ▶ Deliberately disturb a bat (this applies anywhere, not just at its roost), in particular in such a way as to be likely to:
 - ▶ Impair their ability to survive, breed or reproduce, or rear or nurture their young;
 - ▶ Impair their ability to hibernate or migrate.
 - ▶ Affect significantly the local distribution or abundance of that bat species;
- ▶ Damage or destroy a breeding site or resting place of any bat;
- ▶ Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection; or
- ▶ Intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection (this is taken to mean all bat roosts whether bats are present or not).

In addition, five British bat species are listed on Annex II of the Habitats Directive. These are:

- ▶ Greater horseshoe bat (*Rhinolophus ferrumequinum*)
- ▶ Lesser horseshoe bat

⁹ Some species, such as game birds, are exempt in certain circumstances.

- ▶ Bechstein's bat (*Myotis bechsteinii*)
- ▶ Barbastelle (*Barbastella barbastellus*)
- ▶ Greater mouse-eared bat (*Myotis myotis*)

In certain circumstances where these species are found the Directive requires the designation of Special Areas of Conservation (SACs) by EC member states to ensure that their populations are maintained at a favourable conservation status. Outside SACs, the level of legal protection that these species receive is the same as for other bat species.

Reptiles

The four widespread¹⁰ species of reptile that are native to Britain, namely common or viviparous lizard, slow worm (*Anguis fragilis*), adder (*Vipera berus*) and grass snake (*Natrix natrix*), are listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are afforded limited protection under Section 9 of this Act. This makes it an offence, inter alia, to:

- ▶ Intentionally kill or injure any of these species.

Great crested newt (*Triturus cristatus*)

The great crested newt is listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). It is afforded protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, inter alia, to:

- ▶ Deliberately capture, injure or kill any such newt;
- ▶ Deliberately disturb any such newt, in particular in such a way as to be likely to:
 - ▶ Impair their ability to survive, breed or reproduce, or rear or nurture their young;
 - ▶ Impair their ability to hibernate or migrate.
 - ▶ Affect significantly the local distribution or abundance of that species;
- ▶ Deliberately take or destroy the eggs of such a newt;
- ▶ Damage or destroy a breeding site or resting place of any such newt;
- ▶ Intentionally or recklessly disturb any such newt while it is occupying a structure or place that it uses for shelter or protection; or
- ▶ Intentionally or recklessly obstruct access to any place that any such newt uses for shelter or protection.

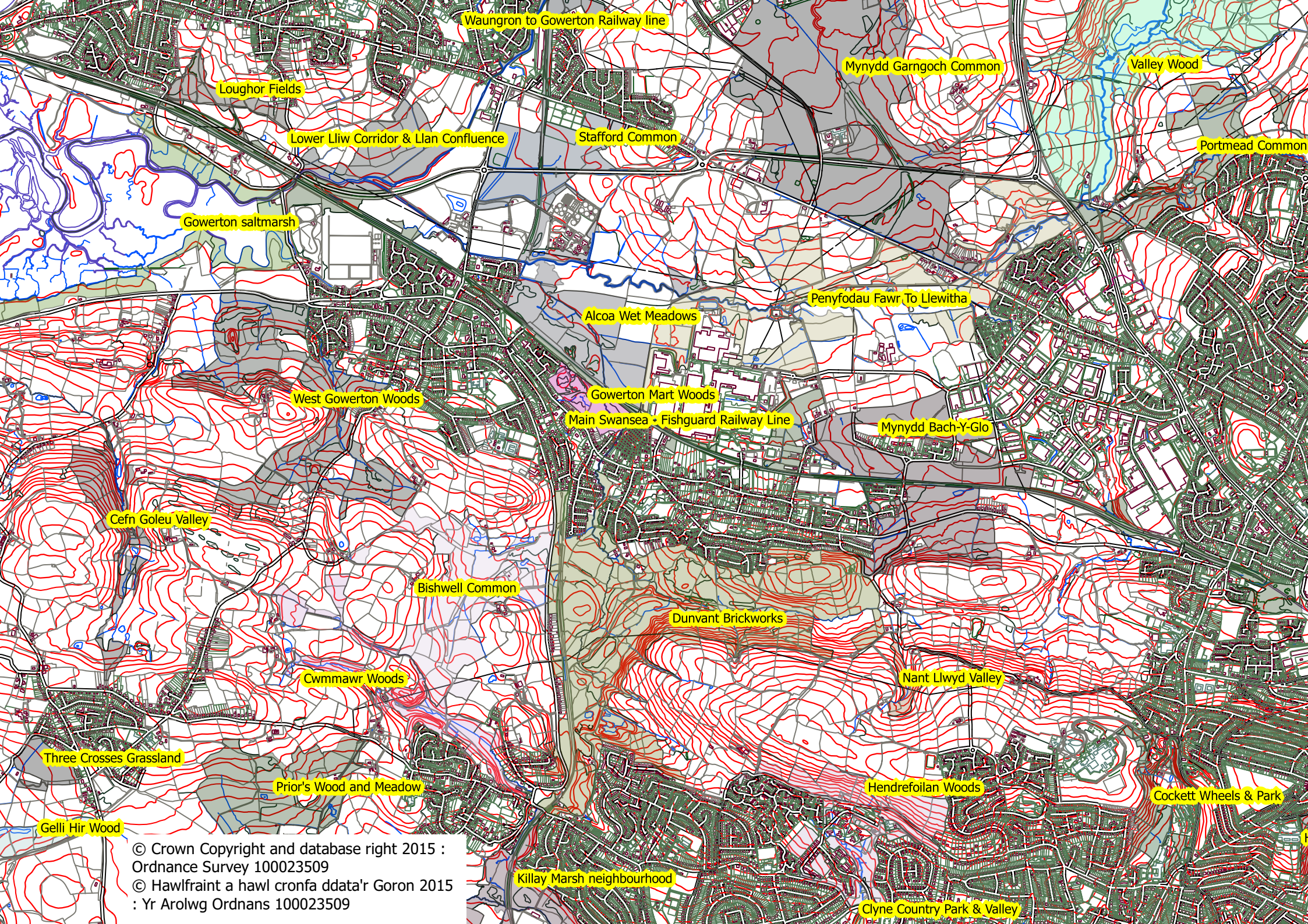
This relates to both the aquatic and terrestrial habitat they occupy. The legislation applies to all life stages of this species.

¹⁰ The other native species of British reptile (sand lizard and smooth snake) receive a higher level of protection in England and Wales under the *Conservation of Habitats and Species Regulations 2010* and the *Wildlife and Countryside Act 1981* (as amended). However, the distribution of these species is restricted to only a very few sites. All marine turtles (*Cheloniidae* and *Dermochelyidae*) are also protected.



Appendix B

Location of SINCs



Waungron to Gowerton Railway line

Mynydd Garngoch Common

Valley Wood

Loughor Fields

Lower Lliw Corridor & Llan Confluence

Stafford Common

Portmead Common

Gowerton saltmarsh

Penyfodau Fawr To Llewitha

Alcoa Wet Meadows

West Gowerton Woods

Gowerton Mart Woods

Main Swansea - Fishguard Railway Line

Mynydd Bach-Y-Glo

Cefn Goleu Valley

Bishwell Common

Dunvant Brickworks

Nant Llwyd Valley

Cwmmawr Woods

Three Crosses Grassland

Prior's Wood and Meadow

Hendrefoilan Woods

Cockett Wheels & Park

Gelli Hir Wood

Killay Marsh neighbourhood

Clyne Country Park & Valley

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Appendix E

Noise Assessment

BS4142 Noise Assessment

Report No: 3291-R1 Titanium Road, Swansea, SA5 4SF – 07/05/2015

Client: GF Energy Ltd

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Report Revisions	Date		
3291-R1	02/05/2015	Initial Report	
	Produced by:	Checked by:	Authorised by:
Name:	Steve Clow MIOA	Steve McKeever AMIOA	Steve Clow MIOA

Steve Clow MIOA, is a member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve Clow has over 15 years experience in an acoustic consultant capacity working on many assessments involving planning and regulatory services.

Steve McKeever AMIOA, is an associate member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve McKeever has 10 years experience working in acoustics and 5 years in an acoustic consultant capacity.

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1. Introduction

Clover Acoustics Ltd has been appointed by GF Energy Ltd to carry out a BS4142 noise assessment at the site of a proposed Gas Fuelled Capacity mechanism Embedded Power Plant consisting of 37 gas fuelled generators at land off an existing generating facility at Titanium Road, Swansea, SA5 4SF. The equipment is designed to respond to demand for electricity at times of peak demand and has the capacity to operate during day and night-time hours.

A baseline noise survey has been carried out over a representative period in order to establish the existing background noise levels. The survey was conducted at one monitoring location covering a typical quiet night-time period between Thursday 30th April 2015 and Friday 1st May 2015.

The purpose of this report is to demonstrate that due consideration for noise affecting neighboring residential properties has been made and to assess the significance of any noise impact from the operation of the units

2. Assessment Methodology

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

BS4142 gives a method for rating sound from industrial and commercial sources affecting people inside or outside dwellings or premises used for residential purposes. An initial estimate of the significance of the sound from the industrial/commercial nature can be assessed by subtracting the measured background noise level from the rating level (this is the specific sound level of the source with any corrections or penalties for distinctive acoustic characteristics). Typically, the greater the difference, the greater the magnitude of the impact.

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3. Site Description

The proposed site is located adjacent an existing generating site within an industrial area. The site is industrialized to aspects to varying degrees. The proposal is to install 37 x Generator Units in dedicated acoustic enclosures to respond to electricity needs at times of peak demand. The location of the proposed installation is identified in figure 1 below.

Residential properties have been identified as being approximately 520m from the site to the south on Roseland Road.

Figure 1 shows the site location:



Figure 1 – Site Location and Background Monitoring Position

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 118	28952	08074
Acoustic Calibrator	Norsonic 1251	32856	U16611

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 118	28952	113.9	-26.2	113.9	-26.2

Measurements & Timescales

During the survey 5-minute measurements were made over a typical 24-hours period between Thursday 30th April 2015 and Friday 1st May 2015 at a location deemed to be representative of the nearest sensitive receiver.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{Amax,T}$

The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20 μ Pa).

Meteorology

Wind speed measurements were recorded during the background survey close to the noise monitoring location. Wind speed measurements were below 5m/s⁻¹.

Temperature was recorded at 13°C and there was no precipitation during the measurement period. Cloud cover was estimated at 20%.

Position of Monitoring Equipment

The equipment was mounted free field 1.5m from the ground at a location representative of the nearest receivers. Figure 2 shows the site boundary plan.

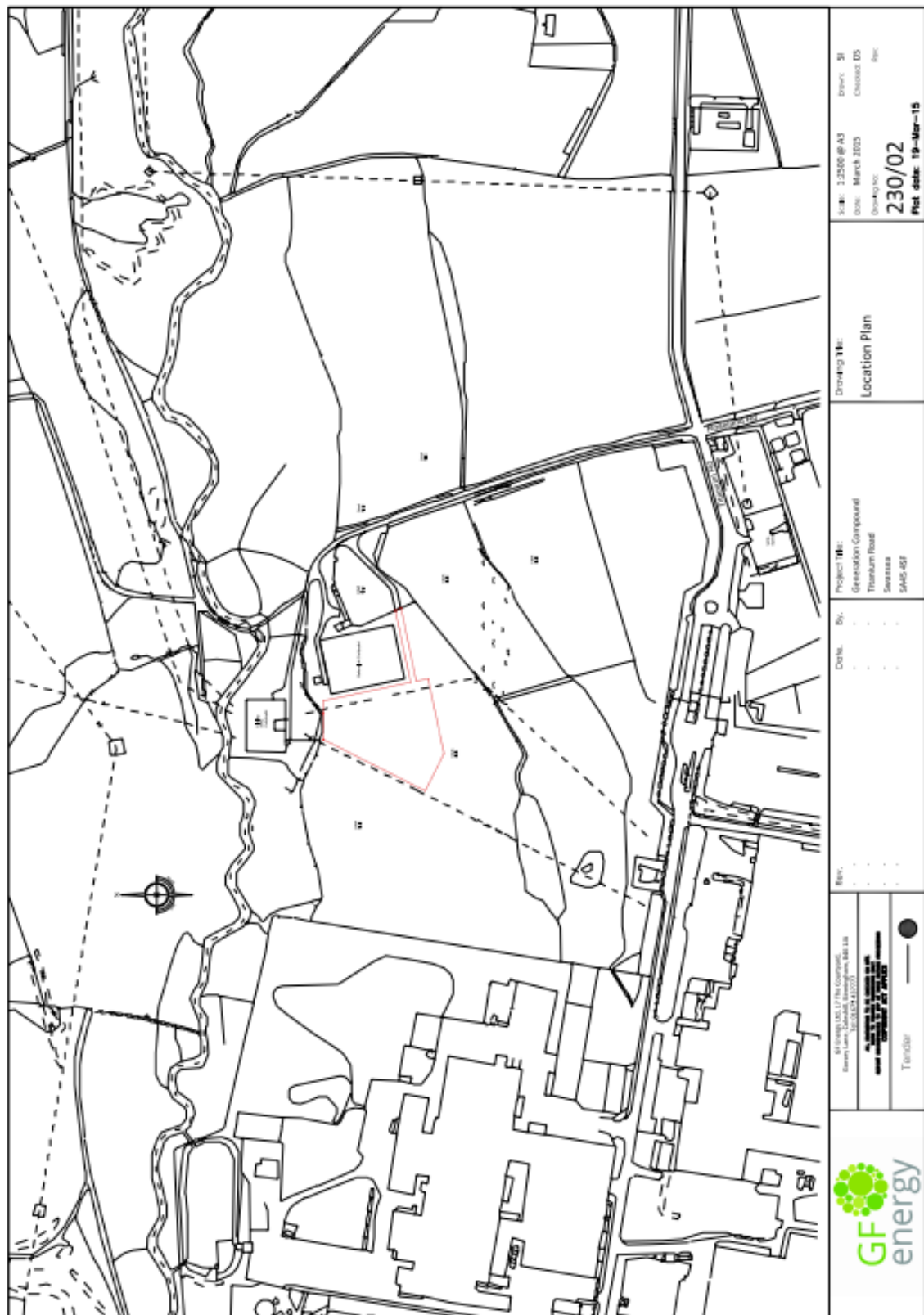


Figure 2 – Site Location Plan

5. Survey Results

Background Noise Summary

The following tables show the summary of the background noise levels monitored. The reported results represent the free field sound pressure levels at the receivers.

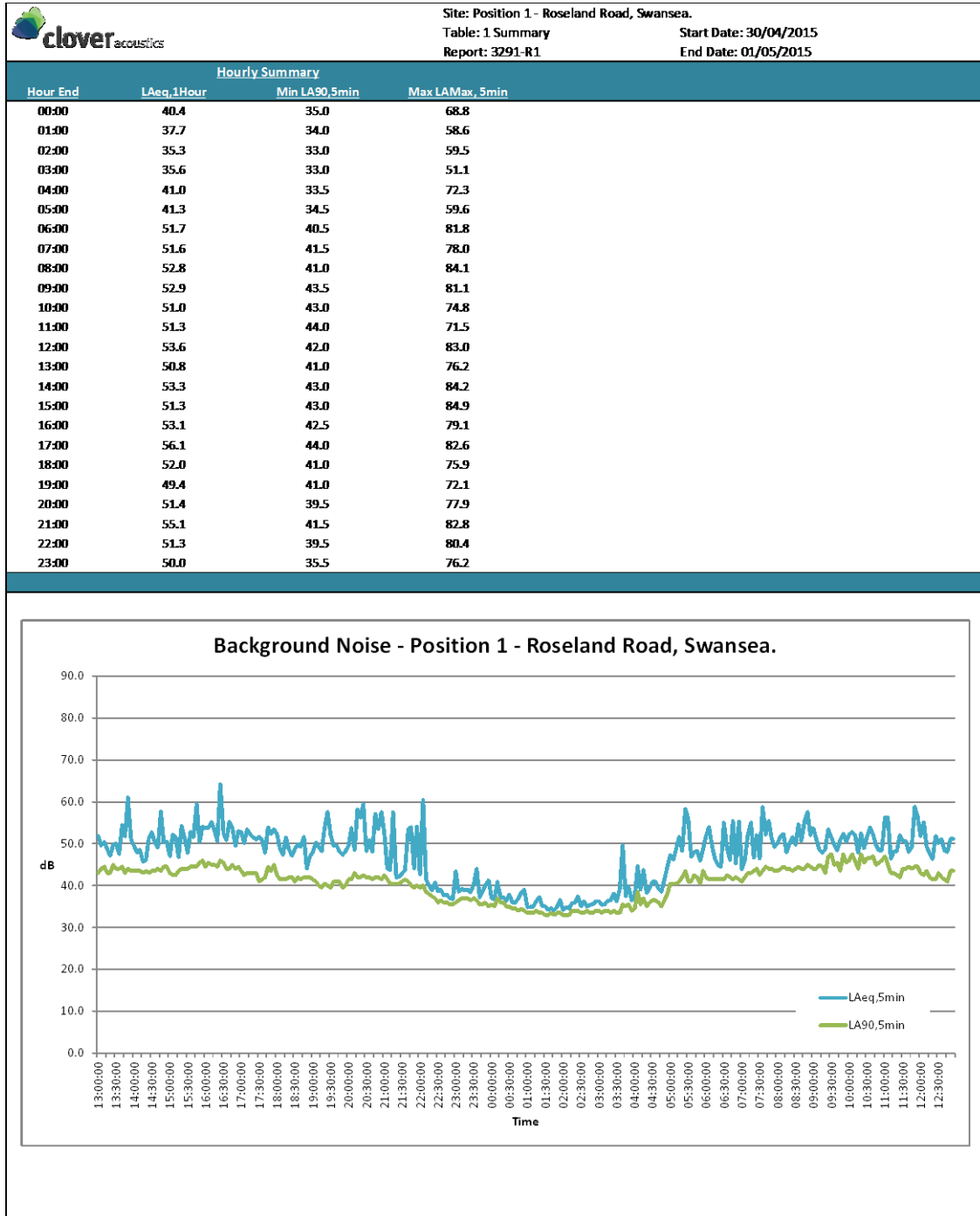


Table 1 – Background Monitoring Results

Monitoring Position 1	
Lowest Daytime dB LA90,5min	36
Lowest Night Time dB LA90,5min	33

6. Noise Assessment

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

Specific Noise Source

The client has indicated that 37 containerised generator units in dedicated acoustic enclosures are to be installed and an indicative layout is included below:

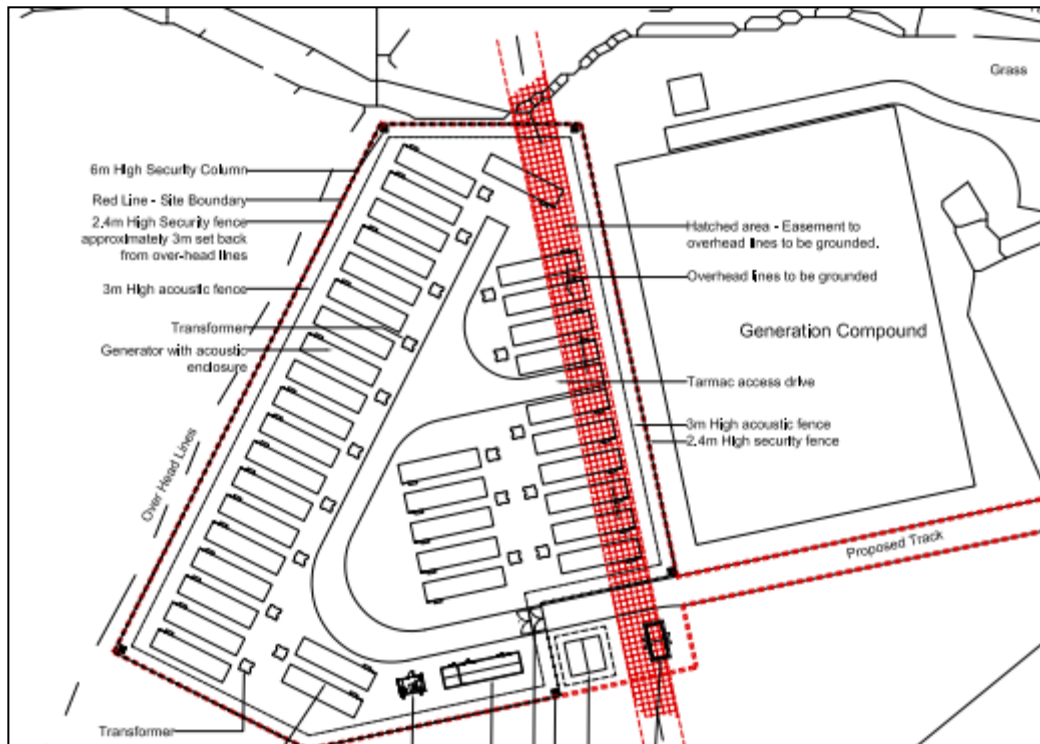


Figure 3 – Proposed Layout

It is understood that the client has commissioned bespoke acoustic enclosures to limit noise output from the units to 75dB(A) @ 1meter. On this basis the resultant sound pressure level for 37 units combined is a noise level of 91dB(A). The *lowest* background noise level monitored during the night-time monitoring period was 33dB $L_{A90,5min}$.

Acoustic Feature Correction

BS4142:2014 allows for a character correction to be applied to the specific sound level where acoustic features are present at the assessment location. The specific sound level can be considered a steady source and has been predicted to be below the existing background. In this instance we estimate the source may be considered barely perceptible and it would therefore be prudent to include a 2dB penalty.

Context

The receivers are some distance from an industrial complex with multiple units and varied noise producing activities. The proposed site is next to an existing generating facility.

Barrier Attenuation

Screening of the site to prevent line of sight to the source would reduce noise levels at the receiver. In this case a 4m¹ close boarded fence is identified. It is understood the client has specified a “deceunick” walling system which would be a suitable barrier. For this assessment -10dB attenuation through screening has been accounted for.

Distance Attenuation

The nearest sensitive receivers identified to the south will be approximately 520m from the proposed equipment. Distance attenuation of -54dB can be calculated using the following formula

$$L_{p2} = L_{p1} + 20 \log \left(\frac{r_1}{r_2} \right)$$

BS4142 Assessment

Installing units with a combined noise output of 91dB and applying the factors discussed above would predict a noise rating level of 29dB(A) at the receiver. This would give an assessment level of 4dB below the measured existing background noise level. BS4142 advises, “The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”.

BS4142 Assessment		dB(A)
Specific Noise Level at Receiver		91
Distinctive Penalty		2
Distance Attenuation		-54
Barrier Attenuation		-10
Rating Level		29
Background Level L_{A90}		33
Rating Below Background		-4

¹ The layout plan identifies a fence height of 3m however this should be increased to 4m

7. Recommendations

The barrier fence height is to be 4 meters with a minimum superficial mass of 15Kg/m² to ensure the barrier attenuation is not compromised by sound passing through the barrier. The barrier should be of solid construction with timber thickness of at least 20mm in all places. 25mm timber boards mass is around 16Kg/m². The timber boards should continue across fence posts and with large overlaps to prevent gaps appearing over time. It is understood that Decoroc acoustic walling system has been specified on some of the clients' sites and this would also prove a suitable 4m barrier.

8. Conclusion

A BS4142 noise assessment has been carried out at the nearest receivers to a proposed gas fueled power plant at Titanium Road, Swansea, SA5 4SF to assess the impact of the proposed installation. A background noise survey was conducted during Thursday 30th April 2015 and Friday 1st May 2015 at a location representative of the nearest sensitive receivers.

An assessment has been made in accordance with BS4142 which has shown that the proposed installation would predict a noise rating level of 4dB below the local background. According to BS4142 this is indicative of the proposed source having a low impact.



Steve Clow MIOA
Acoustic Consultant

9. Appendix

Glossary of Terms

Specific Noise Source

The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$

The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$

The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise

The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise

Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T

The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band

A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band

A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Photo Appendix



Figure 4 – View towards receiver



Site: Position 1 - Roseland Road, Swansea.
Barrier Attenuation
Report: 3291-R1

Start Date: 30/04/2015
End Date: 01/05/2015

Barrier Attenuation

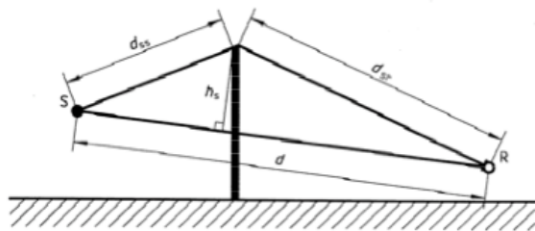


Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

from ISO 9613-2:1996

Noise Source	Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Description: LPG Engine in acoustic Container	Source Octave Spectrum	dB(A)	52	76	72	80	82	80	78	80
	Source LAeq	dB(A)	87.6							

Barrier Attenuation - Source 1				Frequency	Hz	63	125	250	500	1000	2000	4000	8000	
Source to Barrier	4	Receiver to Barrier	496	Barrier Attenuation	dB	5.4	5.9	6.8	8.1	10.0	12.3	14.9	17.7	
Source Height	3.3	Receiver Height	4	Effective Attenuation	dB	5.4	5.9	6.8	8.1	10.0	12.3	14.9	17.7	
Barrier Height	4			Resultant Noise Level	dB(A)	46.6	70.1	65.2	71.9	72.0	67.7	63.1	62.3	
Path Difference	0.060			Resultant LAeq	dB(A)	77.4		Barrier Attenuation dB						-10.3

Figure 5 – Barrier Calculation

