Chapter Three
THE PROPOSED DEVELOPMENT AND LAND USES

INTRODUCTION

3.1 This chapter provides a detailed description of EHL's proposals. It explains both the physical nature of what EHL proposes to build and the operations that will take place once construction is completed.

THE SCHEME IN OVERVIEW

3.2 The proposed site layout, including the principal built elements described in this chapter, is shown in figure 3.1. The central objective of the proposed development is to operate a series of advanced resource management processes in one place so that, together, they can recover as much material and energy as currently possible under closely-controlled environmental conditions. Thus, whereas many waste processing technologies such as incineration combust a large proportion of recyclable material and leave a substantial volume of ash or other material that is typically disposed of to landfill, the Enviroparks concept employs a series of alternative technologies that extract the full recyclable value from the waste stream, and which are capable of leaving only 2.5% of the original material for final disposal to landfill.

3.3 The proposed development would do this by:

- sorting the waste materials that arrive at the site efficiently to extract recyclable materials, and preparing the feedstock for further processing. This takes place in what is called a 'fuel preparation area';

- using five technologies in an interlinked manner to process the residual wastes and recover energy resources.

3.4 These five processes, each of which is explained later in this chapter, are as follows:

- a 'Biomax' separator that extracts oil akin to a biodiesel from organic materials such as waste food, and other food industry products.

- anaerobic digestion, in which biomass waste is placed in sealed vessels and warmed and stirred in the absence of oxygen. This process removes most pathogens and odour from the waste and provides a useful energy source in the form of methane gas and a clean water effluent.

- pyrolysis, in which solid organic wastes are converted to a useful fuel gas under high temperatures and in the absence of oxygen.

- a plasma gasifier process in which any materials are converted to simple gases or an inert, glass-like solid material that can be used as an aggregate in construction.

- the liquid and gas-based fuels produced through these processes would then be used to fuel a range of reciprocating engines located in a proposed 'engine house'. Some of this recovered energy will then be used by a 'high energy user' – a manufacturing employer with high energy needs, occupying an industrial unit proposed in the northern part of the Enviroparks site.

3.5 The proposed Enviroparks development at Hirwaun is intended to be the first in a series of such projects across the UK. EHL wants to use this site as a showcase for its resource management approach, to which end the various processes described will be accommodated in buildings of bespoke architectural design in a landscaped setting. Buildings on the site have been designed to achieve 'excellent' standard under BREEAM – the Building Research Establishment Environmental Assessment Method.

3.6 Furthermore, the proposed development includes a visitor centre designed to accommodate visiting parties from organisations such as schools and colleges. The site design will allow these visitors and other interested parties to be given an educational tour of the facility, enabling them to see the various recovery and recycling processes at close quarters.

3.7 The proposals will now be described in detail.

THE SCHEME IN DETAIL

Physical extent of development

3.8 Built development including roads and other hard-surfaced areas would cover approximately five hectares of the site and comprise 27,562 square metres (m^2) of buildings, 30,352 m^2 of external roads and hardstandings and 17,497 m^2 of 'soft' landscape, including mounds, planted areas and water features.

3.9 As explained in the overview section above, the site will be divided into several process areas, accommodating the following activities.

Fuel preparation area

3.10 Unacceptable waste supplies or 'feedstocks' will be refused entry if they fail an initial inspection and screening process. All feedstocks arriving on site would be checked for quality assurance purposes. Acceptable feedstocks would then be weighed on a weighbridge and directed to the appropriate process area. Fat or vegetable oil-bearing food

wastes, including waste classified as animal by-products, would be sent to the Biomax reception area. Other mixed feedstocks would be directed to the fuel preparation area where they would be transferred under controlled conditions into the first of two holding bunkers. The first bunker would be able to store the equivalent of three days' maximum throughput. Feedstocks would then be then shredded into the second holding bunker, capable of storing the equivalent of one day's maximum throughput.

3.11 The feedstock would then be mixed with water and fed into a slowly rotating drum approximately 30 metres in length. The drum contents would be heated by adding steam. Under these conditions the material would be reduced to a wet pulp. After about an hour the material would leaves the drum and pass directly into the recyclate recovery train. This would use water separation to recover metals, plastics, textiles, aggregate and wood. In addition, a cellulose fibre would be recovered which will be used as a fuel. This process uses established technologies and is designed to minimise the need for human intervention.

3.12 The water separated from the process would first be transferred to a day tank for testing prior to being sent to the anaerobic digestion process below. The cellulose fibre would be partially dried before being used as a fuel in the pyrolysers described below. The recovered recylates would be sold 'off site' Any non recyclables would be co-mingled with materials such as the non-degradable fibre from the Biomax process. These would be stored separately prior to treatment by the plasma converter.

3.13 The fuel preparation process will be accommodated in a building 7,082m^2 in floor area, in an L-plan with a maximum dimension of 132.95 m (eastern elevation) and 14.2m in height to the ridge. The building will be kept air-tight and under negative air pressure to contain odours, and the air extracted from the building will filtered and used as the air source in the proposed power house.

A 'Biomax' separator

3.14 The Biomax process employs centrifuge technology under relatively low temperatures to separate the feedstocks into oil, solids and water effluent. The oil is a form of biodiesel and would be used on-site to fuel a diesel engine with heat recovery. (see below). The water would be treated by anaerobic digestion before discharge to the site effluent plant, attaining the required standards before discharging it to the local sewerage network. The remaining solids would be passed forward for thermal treatment by plasma conversion. These processes are explained below. The Biomax process would be housed within a building specified to food industry standards. All operations including storage would occur inside the building under controlled conditions.

3.15 The Biomax separator will be accommodated in a building 2,742m^2 in floor area, 65.2m x 36.9m in plan with 14.2m x 23.8m offices, and 10.95 m in height to the ridge.

Enhanced anaerobic digestion

3.16 Anaerobic digestion is a natural process that involves the breakdown of organic material under sealed conditions in the absence of oxygen. The methane produced would be used as a fuel source for heat and power generation.

3.17 The anaerobic digestion plant would process the aqueous arisings from the fuel preparation area and the Biomax process. The by-product of this process is water. The digestion process would involve several processing steps. The dominant process vessels would include three tanks (15 metres in height and 20 metres in diameter). There would also be three holding tanks, each 13.5 metres in height and 8.6 x 8.6 m in plan, and a gas buffer tank to ensure the engines receive a steady supply of gas (13.5 m in height and 17m in diameter). The anaerobic digestion plant would be set 2.5 metres below local ground level and surrounded by a bund.

3.18 The capture and use of methane is regarded by the applicant as an important benefit of the proposals. Methane would otherwise arise naturally from the decay of organic wastes. Where this occurs in landfill sites, it is known as 'landfill gas'. If allowed to escape to the atmosphere, methane acts as a harmful greenhouse gas with over 20 times the potency of carbon dioxide. Its capture is thus inherently beneficial, and this benefit is multiplied where the methane is used as a renewable form of energy in preference to fossil fuel sources.

Pyrolysis

3.19 Pyrolysis has been used for centuries to make charcoal from wood. The process proposed by EHL is similar but would take place under carefully controlled conditions. The cellulose fibre produced in the fuel preparation area would be passed through a chamber and heated at high temperatures. No oxygen would be allowed to enter this sealed chamber and, as a result, the organic fraction cannot burn. As such, there would be no flame. The bulk of the material would be reduced to a gas, leaving a solid char. This gas would be collected, cleaned and sent to an engine within the building for use as a fuel. The remaining char would be high in carbon, being similar to charcoal. This would be collected and sent to a plasma converter (below) where it would also be used as a fuel.

3.20 The pyrolysis machines together with their associated engines will be housed in a building 2,241 m^2 in floor area, 36.9 m x 60.7 m in plan, and 8.5 m in height to the ridge. The building will have an exhaust stack 40 metres above local ground level and 2.5 metres in external diameter for the emission of engine exhaust gases from both the engines within this building and the engines located within the engine house. This would be the main emissions point to air on the site.

Plasma gasification

3.21 This part of the scheme would subject the remaining unrecyclable materials to high temperature thermal treatment, a process is known as plasma gasification. By intense heat and controlled addition of oxygen all organic material is reduced to a simple gas mix. The

purpose of the plasma torches is to provide an additional high energy gas reaction that ensures the completion of these reactions, resulting in an organically free gas. Any inorganic material such as residual glass or metal is reduced to a completely inert glassy aggregate that can be used in construction.

3.22 The plasma gasifier would be situated alongside the fuel preparation area. This element of the proposals will also incorporate external plant and structures, views of which would be contained by vertical screens.

Engine house and electricity generation

3.23 The processes described above would recover energy resources from the waste stream in three forms:

- oil produced by the Biomax process;
- methane gas produced by the enhanced anaerobic digestion process,;
- the simple gas produced by the pyrolysis and plasma gasification processes.

3.24 These fuels would be is piped to an array of engines with a net generation capacity of about 20 megawatts (MW). These engines would be accommodated in two adjacent buildings, both noise-attenuated and externally resembling a standard industrial unit, each referred to as an 'engine house'.

3.25 The engine house would be 1,573.2 m^2 in floor area, 55.2 m x 28.5 m in plan and 8.82 m in height to the ridge.

3.26 It is proposed that the engine houses will be connected to the local electricity distribution network by means of an underground 11 kV cable connected to the local electricity distribution network at the existing Rhigos sub-station, which lies just over 1 km to the south-west of the Enviroparks site.

Visitor centre and administration building

3.27 The Enviroparks proposal is intended to be a showcase development and a reference site to which waste authorities and contractors from the UK and beyond will be interested in visiting. Accordingly, the proposals incorporate a combined administration and visitor centre at the south-east corner of the site, visible from Fifth Avenue. This will accommodate the site's main reception, security and administration functions, along with an education and briefing area intended for use by commercial visitors and school and college parties of up to 40 in number. The adjacent car park thus includes space for a coach.

3.28 The visitor centre and administration centre is itself intended to be of interest to visitors, because it will be designed to BREEAM 'excellent' standards and will feature various sustainable construction features including a green roof. The building would have two

storeys and is 791 m^2 in floor area, would be built to an L-plan with a maximum external dimension of 20.8 m, and would be 9.4m in height to the ridge.

On-site high energy user

3.29 The Enviroparks concept seeks to recover as much material and energy resources as possible from the waste stream. In view of the fact that the proposed development would generate useful quantities of heat and power, and that heat is best used as close to its source as possible to avoid losses, a use class B1 / B2 industrial unit is proposed on the part of the application site. With energy costs currently high and forecast to follow a rising trend in the long term, it is envisaged that the availability of heat will be particularly attractive to inward investors.

3.30 An occupier for this unit has yet to be confirmed although, at the time of writing, there are indications that the building will be occupied by a company that makes plastic bottles and containers, using both heat and power generated on the site and, potentially, the plastic materials recovered in the fuel preparation building already described. The high-energy user building would measure 152.2 m x 61.7 m in plan and 14.2 m in height to the ridge, with a total floor area of 10,240 m^2.

Site access, circulation and parking

3.31 As figure 3.1 shows, vehicular access to the site would be from Fifth and Ninth Avenues. Internally, the site has been arranged to facilitate the safe and efficient movement of commercial vehicles around the site, and to ensure safe separation of operational and visitor traffic. The principal car park will be adjacent to the visitor centre and administration building in the south-east corner of the site. As noted, this will incorporate appropriate manoeuvring and parking spaces for cars and a visiting coach.

3.32 The development will incorporate covered bicycle parking and shower / changing facilities for cyclists. There is an existing bus stop nearby the site at Rhigos Road.

3.33 The visitor centre and administration building would incorporate provision for disabled access.

Site layout and landscape

3.34 The buildings and structures described above would be laid out in a manner reflecting a range of planning and design considerations. These are considered in detail in the *Design and Access Statement* that accompanies EHL's planning application. Beyond operational efficiency, these considerations include a desire to present a coherent and attractive elevational appearance in external views of the site – particularly from Fifth and Ninth Avenues and from the Penderyn reservoir embankment on the northern site boundary. As far as possible, the design intention is to present a development that would not look out of place in a use class B1 business park.

3.35 To this end, the buildings have been designed to what is an unusually high specification for this type of use, and structures of a more industrial appearance, such as the anaerobic digester tanks and the plasma gasifier, would be located towards the centre of the site so that they would be substantially screened by other buildings in external views. Building materials and colours have been selected to integrate the development into the local landscape in elevated views from the reservoir embankment and the slopes of Moel Penderyn to the north, and from Hirwaun Common (the slopes of Llethr Las, Twyn Canwyllyr and Pistyll y Graig) to the south.

3.36 Extensive landscape and planting is proposed around the periphery of the site and within the car park. Plant species would be selected to reflect the aims of integrating new planting with that which already exists on the site boundaries, providing a suitable visual foil for the buildings and some ecological benefit.

SUMMARY OF INPUTS AND OUTPUTS

3.37 EHL is thus proposing an integrated and advanced resource recovery process. At its heart are several material recovery trains and several engines. The economics of the plant hinges on keeping each of these elements supplied at an economic rate. The combined process is designed to effectively separate an extremely broad range of feedstocks so as to address as many local and national requirements as possible. In practice, whether a feedstock is a waste or non-waste is immaterial to the operation of the plant. The pricing structures and gate fees attributed to wastes are often greater than those for non-wastes. The process will be appropriately regulated and controlled so as to comply with the legal obligations of waste processing waste.

3.38 Accordingly, to define a specific daily throughput of feedstock is inappropriate as it is clearly dependent upon the composition and make up of that day's arisings. Given the need to state a throughput rate relevant to arisings and dispersals from the site the annual throughput of the site is unlikely to exceed 250,000 tonnes.

3.39 Electricity exported to the local electricity distribution network from the site is predicted to be in the region of 160,000 megawatt-hours (MW/h) of electricity per year based on maximum throughput as described above. Approximately, this is sufficient electricity to power approximately 40,000 homes (reference: energywatch.org.uk)

3.40 Recyclable materials or 'recyclates' recovered on the site will include ferrous and non-ferrous metals, plastics, and aggregates including glass

3.41 The Enviroparks process is designed to optimise both the quality and quantity of these recovered recyclates. If, for example, local household waste arisings of approximately 140,000 tonnes per year (t/yr) were processed, then 12,600 t/yr of plastics would be recovered along with 8,700 t/yr of ferrous metals, 1,340 t/yr of non-ferrous metals and 25,000 t/yr of aggregate. In addition, around 40,000 t/yr of cellulose fibre fuel will be recovered for use on site. Because household waste is also quite wet, around 42,000 t/yr of water would be extracted from this material and treated prior to discharge to the local sewers.

3.42 These figures exceed the government's recycling targets for 2025 which are for 70% of waste to be recycled.

3.43 All fuels produced on the site would be used in 'state of the art' reciprocating engines. These are fitted with waste heat recovery systems, the heat being used on the site or by the adjoining high energy user. Engine exhausts would all be monitored and controlled to achieve the required emission limits. All exhausts will be ducted to a triple-flue single stack as previously described.

3.44 Provision has been made for the disposal of approximately 2.5% by weight of unrecoverable material to non-hazardous landfill.

3.45 It is estimated that the overall development, including the high-energy user, will generate c. 200 full-time jobs or their equivalent.

PHASING OF DEVELOPMENT

3.46 The site will be developed in two phases. The first phase would see the construction to operations of the principle site activities. Phase 2 would see the development of the plasma gasifier facility, and the high energy occupier.

3.47 An Environmental Permit (EP) application will be submitted as a single submission, with allowance made for phased development. For the avoidance of doubt, this ES takes into account both phases of the development.

OPERATION OF THE PARK

3.48 The effective operation of the site will require a highly competent workforce. The skills needed can be found locally. Overall control by EHL will reside with a competent management team experienced in the relevant procedures including operations and maintenance, environmental permitting, health and safety, quality assurance, site security, weighbridge, grid connection, electricity production and transmission. Importantly, the EP licence conditions for the whole site will be under control of an EHL-appointed site director.

Environmental monitoring and community liaison

3.49 EHL thus proposes to build an exemplar project in the emerging resource management industry. The technologies proposed are well established and understood, but EHL believes that public understanding and acceptance will be essential for the success of this new industry. To this end, the applicant wishes to maintain a high quality professional relationship with the local community representatives, local authority officers and government regulators.

3.50 Accordingly, it is proposed that an independent liaison group is established as soon as practicable after planning permission has been granted, to allow local residents access to impartial advice regarding EHL and its operations. EHL proposes that this liaison group would be chaired by a local nominated representative, along with a nominated secretary. The other three members would ideally be comprised of a health professional (e.g. local GP), an engineer with experience in waste management and emissions and an environmental specialist. These could be independent volunteers selected by the community councils and the posts would be unpaid, although EHL would pay reasonable out of pocket expenses. EHL would provide whatever information which was reasonably requested in respect of its permissions and operations.