Forth Energy

Appendix A

Environmental Statement

Contents

A. Environmental Statement

A.1 Viewing of Environmental Statement

The Grangemouth Renewable Energy Plant Environmental Statement may be viewed at the following locations during the statutory consultation period, during the opening hours of business of the host establishments.

Falkirk Council
Development Services
Abbotsford House
Davids Loan
Falkirk
FK2 7YZ

Falkirk Library
Hope Street
Falkirk
FK1 5AU

Grangemouth Library
Bo'ness Road
Grangemouth
Fk3 8AG

A.2 Downloading of the Environmental Statement

Copies of the Section 36 Application package, including this Environmental Statement, are available on the Forth Energy website, www.forthenergy.co.uk. . Electronic copies on CD are available free of charge from:

Debbie Barclay
Forth Energy
1 Prince of Wales Dock
Leith
EH6 7DX

A.3 Purchase of Environmental Statement

Paper copies of the Environmental Statement are available from the address above for a charge of £400.00 inclusive of VAT and UK delivery

Cheques should be made payable to Forth Ports PLC. Cash should not be forwarded by mail.

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Forth Energy

Appendix B

Environmental Impact Assessment Scoping Opinion & Response Table

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B. Scoping Opinion & Response Table

B.1 Scoping Opinion

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B.2 Scoping Response Table

TableB1 Scoping Comments and Forth Energy's Response

Consultee	Identifier	Consultee Comment	Response
Scottish Government Energy Consents Unit (SGECU)	SGECU1	The Climate Change (Scotland) Act requires Scottish Ministers to lay a report before the Scottish Parliament every year for the period 2010 to 2050 stating the average greenhouse gas emission per megawatt hour of electricity generated in Scotland in the target year and stating the average greenhouse gas emission per megawatt hour, and the estimated lifetime cumulative emissions, of any new electricity generation capacity greater than 50 MW approved in Scotland that year. This would mean we would require you to provide average per MWh and estimated cumulative emissions for the lifetime of the plant for your biomass plants.	For the Grangemouth Renewable Energy Plant the average greenhouse gas emissions per megawatt hour in specific years are estimated to be 86.7 kg CO_2e / MWh in 2015 (0.024 kgCO_2e / MJ), 80.0 kg CO_2e / MWh in 2020 (0.022 kgCO_2e / MJ), and 72.3 kg CO_2e / MWh in 2025 (0.020 kgCO_2e / MJ). Further detail is presented in the Sustainability Statement.
Scottish Government Air, Noise & Nuisance (SGANN)	SGANN1	In terms of Cumulative Impacts, the EIA will need to take into account changes in air quality conditions associated with the developments cited in Paragraph 2.5.1.	Paragraphs 9.7.75 to 9.7.76 of the ES address cumulative air quality impacts. Further information will be supplied in the finalised ES.
	SGANN2	The Scoping Report states that the cumulative impacts of these developments will be taken into consideration, but it is not set out within the methodology for the air quality assessment how this will be done. The developments will introduce new exposure into the area, and substantial changes to traffic flows are likely to increase local pollutant concentrations. The methodology should state precisely how these issues will be dealt with.	Acknowledged.
	SGANN3	Paragraph 3.4.2 notes that 70-90% of the biomass fuel will be delivered by ship. The air quality assessment should therefore be based on a worst-case assumption of 30% of deliveries by road.	As the fuel burn has increased from that originally envisaged, due to the opportunity to supply 200 MW of heat, the quantity of fuel that will be brought to site by road has been reduced to 10% (by energy). This is the maximum that will be brought to site in this way. The air quality assessment with respect to operational traffic levels has been based on this figure.
	SGANN4	Paragraph 3.4.3 notes that the plant will operate with a "wide variety of biomass fuels". The EIA should provide evidence that the proposed plant is able to conform with the emissions limits for all types of fuel that will be used, and the assessment should be based on worst-case assumptions.	The proposed boiler will be capable of efficiently burning the range of biomass proposed and, with the flue gas abatement proposed, will be able to meet the proposed emission limits with all fuels proposed.
	SGANN5	A high efficiency dust collection system (e.g. bag filters) is proposed (Para 3.8.1). The EIA should set out the potential options for abatement, including the use of ceramic filters to further reduce emissions of particulate matter.	The potential options for particulate control technologies are presented in paragraphs 7.2.29 to 7.2.31 of Chapter 7 and justifies the selected technology, taking into account the environmental effects.

Consultee	Identifier	Consultee Comment	Response
	SGANN6	The review of baseline conditions is to be based on local authorities' air quality monitoring data, their Review and Assessment reports and the UK Air Quality Archive (Para 6.3.9). Given the potential declaration of an AQMA for PM_{10} in the city (Para 6.3.4) it is queried as to whether these sources will be sufficient to adequately describe the existing air quality climate. This is particularly the case for $PM_{2.5}$ concentrations for which there is a paucity of data. Further justification for not undertaking a local baseline monitoring study should be provided.	Both background mapping, local and national air quality monitoring data have been used to establish baseline conditions in the vicinity of the site. It is considered that there is sufficient monitoring data to enable a robust assessment of impacts on local air quality. $PM_{2.5}$ data was derived from local monitoring data provided by Falkirk Council and a report produced by AEA Technology "Measurement of PM_{10} and $PM_{2.5}$ in Scotland with Gravimetric Samplers". Please see Section 9.4.
	SGANN7	Reference is made only to the Air Quality Standards (Scotland) Regulations (Statutory Instrument 2007 No 182). The purpose of the 2007 Regulations is to transpose the EU directives into Scottish legislation. The 2007 Regulations therefore make no reference to the more stringent PM_{10} and $PM_{2.5}$ objectives that have been adopted by the Scottish Government. Furthermore, the 2007 Regulations are shortly to be replaced by the 2010 Regulations that will transpose the new Air Quality Directive (2008/50/EC). It is critical that the ES properly addresses the impacts associated with the air quality objectives for Scotland and the $PM_{2.5}$ limit values.	These standards are addressed in Chapter 9 Air Quality.
	SGANN8	Reference is made to the assessment of acid and nitrogen deposition, but the approach is not described. How will these effects be determined?	The methodology used to assess acid and nitrogen deposition is given in Section 9.3 and Appendix C of the ES.
	SGANN9	The impact of HGV movements during operation is to be assessed using the DMRB model. The Scoping Report makes no reference to how the combined effects of the stack emissions and HGV traffic will be considered. In addition, no reference is made to verification of the DMRB model which is an essential step. It should also be recognised that the current version of the DMRB model does not incorporate the latest vehicle emission factors. If there is any indication of significant impacts from HGV movements then it is advised that use is made of the emission factors set out in the new Emission Factor Toolkit within a more detailed model.	Traffic flows likely to occur during the operational phase would be significantly less than those during the construction phase (i.e. 114 daily movements during the operational phase (which includes fuel deliveries and staff vehicles) compared to around 600 daily movements during the construction phase). The construction phase of the development does not require an air quality assessment (a screening assessment in accordance with the Environmental Protection UK (EPUK) guidance[1] is presented in paragraph 9.7.9). As the potential impact due to road traffic emissions during the operational phase will be significantly less than during the construction phase, assessment for the operational phase was not considered necessary.
Scottish Government Ports and Harbours (SGPH)	SGPH1	Would strongly recommend that a navigation risk assessment is required in the EIA for the marine structure elements of the proposal along the lines of the MCA guidance for offshore renewables in MGN 371.	Please see MS-AE4.

[1] Environmental Protection UK, Development Control, Planning for air quality (2010 update), April 2010.

Consultee	Identifier	Consultee Comment	Response
Scottish Government Water Pollution Control (SGWPC)	SGWPC1	In relation to the above scoping opinions, without prejudice to any further consideration Scottish Ministers may be required to give to the application, we have no comments available which may be considered relevant in regard to water supply, water protection, sewerage or flood prevention.	Acknowledged.
Scottish Government Flooding Policy (SGFP)	SGFP1	In relation to the scoping opinions, without prejudice to any further consideration Scottish Ministers may be required to give to the application, we have no comments available which may be considered relevant in regard to water supply, water protection, sewerage or flood prevention.	Acknowledged.
Falkirk Council (FC)	FC1	From a noise point of view, I would expect the finished development to be able to operate without causing an increase to existing background noise levels (frequency based).	Chapter 12 'Noise' addresses the impacts of the plant with respect to the appropriate guidance which recommends methods of assessment for operating noise, consideration of the noise impact of the development and whether there will be a significant effect. The noise modelling has been completed and the results show that that there will not be a significant effect from operational noise at any noise sensitive receptor. This is achieved through early consideration of outline noise mitigation measures tailored to the development site and detailed, along with full data on the noise model.
	FC2	Noise from the construction phase would be dealt with as a separate issue under the Control of Pollution Act.	Acknowledged.
	FC3	I do not anticipate Noise from the transportation of the fuel will cause any problems.	Acknowledged.
	FC4	SEPA are likely to regulate this process with regard to emissions to air through PPC. However, Council's are responsible for reviewing air quality in their area. In terms of the modelling proposed in the scoping report: The scoping report proposes that air quality modelling will be done, the Council agrees with this.	Acknowledged.
	FC5	The proposed plant is located within an Air Quality Management Area for a breach of the sulphur dioxide 15-minute objective. SEPA will regulate PM_{10} according to the European limit values. However, local authorities are required to assess against more stringent levels for particulate matter (PM_{10}) and so the modelling should include comparisons to these objectives are well.	Acknowledged please see Chapter 9.

Consultee	Identifier	Consultee Comment	Response
	FC6	The other pollutant likely to be of concern for local air quality management is nitrogen dioxide. The Council is about to declare air quality management areas for NO_2 in Falkirk Town Centre and Haggs.	Acknowledged please see Chapter 9.
Scottish Natural Heritage	SNH1	Generic issues that the ES and possibly any Habitats Regulations Appraisals will need to cover in relation to designated sites include: • Disturbance to birds through construction activities (including pile driving and vibration), increased ship movements and disruptions of flight lines. • Damage to intertidal habitats during construction of water intake/outfall pipes. • Ground contamination released during construction activities. • Pile driving/vibration in relation to migratory fish. • Entrainment of fish in cooling water intakes. • Hot water plumes from cooling water emissions. • Biocides in cooling water emissions. • Atmospheric emissions.	It was agreed with SNH (meeting 19/05/10) that shipping impacts would not need to be addressed with respect to ecology and the European sites at Grangemouth. All other aspects are covered in both the ES and Information to Inform a Habitats Regulations Assessment. The latter document will follow the gateway check and will be submitted with the Section 36 Application.
	SNH2	Bird survey methodologies should be standardised as far as possible. Additional sources of information in relation to birds should include: • BTO Atlas http://www.bto.org/birdatlas/ • NBN http://data.nbn.org.uk/ • WeBS http://www.bto.org/webs/index.htm It is not necessary to separately assess Ramsar sites as these are effectively the same as their related SPAs.	Standard methods, or methods specifically agreed with SNH for previous projects have been used, as discussed and agreed with SNH (meeting 19/05/10).
	SNH3	With regards to atmospheric emissions, further discussion is required with both SEPA and SNH to determine the most appropriate modelling approach to assessing the potential impacts from air emissions. The assessment of the effects of atmospheric emissions on designated sites should not be limited to a 10km or 15km radius, but should be based on a properly justified modelling of likely effects based on predicted emissions, resultant deposition rates and distances and prevailing weather conditions at each site. We will also wish to see the cumulative assessment of the four sites and also the in combination effects with existing generating sources of air emissions. This modelling work may also be required to inform an appropriate assessment.	Changes in air quality and deposition have been considered at all designated sites within 15 km. The potential to impact on sites outside this distance was also considered as described in paragraph 9.7.63. It was agreed with SNH (meeting 19/05/10), that cumulative effects with the Dundee Renewable Energy Plant proposals do not need to be addressed for the Grangemouth project due to the distances involved. The cumulative impacts with the Rosyth and Leith Renewable Energy Plants and also Longannet Biomass Plant have been considered.
	SNH4	There may be the potential for the release of ground contamination during construction. This could potentially affect adjacent water bodies and designated sites and therefore requires assessment.	Please see Chapter 14 'Hydrology, Hydrogeology and Geology' and also Chapter 13 'Aquatic Ecology'.
	SNH5	In relation to ash disposal: • How realistic are plans to sell the ash produced? • How many lorry loads per week does 20,000 tonnes equate to and would this give rise to significant transport issues around the various port sites?	Forth Energy is confident that a proportion of the ash will be sold and have already had some interest from prospective buyers. Ash generation has been calculated following further engineering design work to be a maximum of 20,000 tonnes, equating to 1,000 lorry loads per annum.

Consultee	Identifier	Consultee Comment	Response
	SNH6	Is ash storage within the site an issue, e.g. potential for the contamination of nearby designated sites or water bodies or are there human health issues?	All ash storage will be in enclosed silos. There will be no disposal of the ash on site.
	SNH7	Is disposal to landfill an acceptable option given current local landfill capacities (BPEO)?	It is Forth Energy's intention to recycle the ash generated, as far as practicable, in order to avoid its disposal to landfill. The ash should be suitable for re-use in e.g. the construction and fertiliser industries (as a soil improver) and Forth Energy is currently investigating a range of recycling options. Any ash for which a recycling option is not available will be disposed of to landfill, in accordance with current waste management requirements. The quality of the ash produced will dictate which type of landfill it will be sent to. Depending on the amount of activated carbon and lime needed to control emissions when burning waste wood, paper and cardboard, the ash could be classified as hazardous. Data published by SEPA (2008) indicate that there is one hazardous waste landfill facility within 5 km of the site with capacity to receive 200,000 tonne of waste per annum. There are also 5 non-hazardous landfill facilities within a 75 km radius of the site with aggregate capacity to receive over 1.6 million tonnes of waste per annum. Please see 'Waste Generation and Disposal' in Section 6.5 of Chapter 6 'The Proposed Development'.
	SNH8	It may be helpful to compare amount of ash produced to the quantities produced by conventional power stations around the Forth in order to give some context for the non-specialist reader.	The Grangemouth Renewable Energy Plant will produce 20,000 te of ash per annum. For comparison: • Longannet Power Station (2400 MW) produces approximately 350,000 te per year of ash (assuming 40% load factor x 1000 te of coal /hour x 24 hours x 365 days x 10% ash); and • Cockenzie Power Station (1200 MW) produces approximately 130,000 te per year of ash (assuming 30% load factor x 500 te of coal per hour x 365 x 10% ash
	SNH9	We understand that detailed designs won't be submitted with the Section 36 applications and that the deemed planning consent associated with a Section 36 consent would be conditional upon the developer agreeing detailed designs with the relevant planning authority prior to construction. Landscape assessment at the EIA stage will be based on 'worst case scenarios' examining maximum footprint, height, bulk, etc. Currently, our main concerns in relation to the landscape scoping are the need to expand the ZTV from 10km to 30 km	A ZTV to 30 km is included in Figure 10.1.
	SNH10	and the inadequate consideration of the visibility/impact of plumes.	The visibility of the plume is addressed in detail in Chapter 9 Air Quality and Chapter 10 'Landscape and Visual Impact'.

Consultee	Identifier	Consultee Comment	Response
	SNH11	The ES should clarify what separate consents, e.g. CAR, PPC, WML, will be required and whether separate appropriate assessments will be required for each of these. We recommend that all of the information required to undertake appropriate assessments in relation to these licensing processes should be contained within the ES.	A list of consents required is given in Section 2.7 of Chapter 2 'The Statutory Context'. All relevant information available at this time is provided in Appendix E Information to Inform a Habitats Regulation Assessment.
	SNH12	We expect to see a robust sustainability appraisal which assesses the total carbon footprint of the proposals taking into account the full range of likely sourcing options.	Please see the Sustainability Statement.
	SNH13	Generic Landscape Comments: Landscape assessment will be based on 'worst case scenarios' examining maximum footprint, height, bulk, etc. We recommend that consideration of alternative designs and layouts be included as part of the EIA.	The assessment of residual effects presented in Sections 10.7 and 10.10 of Chapter 10 'Landscape and Visual Impact' relates to the maximum engineering envelope. There are two alternative layouts (i.e. either open storage or silos for the main fuel storage facilities) and both of these have been considered.
	SNH14	In relation to the Assessment of Landscape Character: We would like clarification as regards the landscape sections of each site report. The report states that 'A landscape character assessment will establish the baseline landscape character of the study area.'. Does this mean that a new landscape character assessment will produced for each of the four study areas, or does it mean that the existing LCA (Landscape Character Assessment), will be used to form the basis for the study? If it is the second, then with reference to the areas produced in Figure 4 for all sites, there are some errors within them which we will be happy to clarify with the landscape consultant. The colour coding of the areas is also slightly confusing, this could be to do with how they printed, we would suggest using significantly different colours on each LCA to ensure that there is no confusion between areas.	The existing LCA study work is used as a baseline where this is available. Further urban//townscape character study work has been undertaken to complete this picture. The colours have been amended in Figure 10.4 SNH Landscape Character Types.
	SNH15	Assessment of Visual Impacts**:** SNH have recently produced guidance relating to siting and designing windfarms. Parts of this guidance may prove useful to the assessment of the biomass plants. Other useful guidance can be accessed on the renewables page of the SNH website at http://www.snh.org.uk/strategy/renewable/sr-re00.asp.	Clarification from SNH (meeting 19/05/10) as to which aspects of the wind farm LVIA guidance SNH consider relevant to the proposed Renewable Energy Plant, was that this related to the preparation of the visualisations (i.e. Newcastle University report and SNH 2002). All relevant aspects of these are addressed.

Consultee	Identifier	Consultee Comment	Response
	SNH16	In relation to the ZTV, while accepting that the most significant visual impacts are likely to be within the 10 km boundary, as can be seen from the draft ZTV's the theoretical visibility appears to extend further out than this. We believe that the size of the stack, boiler house and plume should form the relevant consideration for determining the study area and extent of ZTV (Zone of Theoretical Visibility). We note that the draft ZTVs do not account for plume visibility. As we understand it the plume size is variable and dependent on a number of factors. A ZTV for plume height as well as stack and building SNH should be produced. The assessment should be conducted taking into account maximum plume size to allow the full effects of the proposal to be properly assessed. Further information on quantifying plume impacts can be found in the Horizontal Guidance Note IPP6 H1. We would expect plume assessment to include: • A general discussion of the predicted plume characteristic. • A review of the cumulative plume context of the area. • A ZTV for average and maximum length of plume. • An assessment of the plume as a component of the overall development from representative viewpoint locations, with a consideration of how the plume may change at different times of the year. We also note that the relative heights of the buildings/stack are not necessarily set. We would therefore like the ZTV's to go out to a radius of 30km (SNH's advice Visual Representation of Windfarms, Good Practice Guidance, page 36), to help assess whether there may be any significant impacts on sensitive viewpoints further out than the current 10km. This could potentially lead to a request for further viewpoints – we would be pleased to discuss this with the applicant as part of the iterative process of landscape assessment. We will discuss specific viewpoints in the site specific sections of the report. The use of photomontage is encouraged especially for those viewpoints within 5km of the site or for those viewpoints where significant impacts are likely to occur. Please refer to SNH guidance on best practice advice for producing visualisations (although based on windfarms the same techniques will apply to this development). The detailed assessment area should be informed by the ZTV; it is likely that it will be in the region of a 5km radius, extending to 10km where appropriate	Please see response to SNH9. A ZTV showing stack and boiler height visibility is included as Figures 10.1, 10.2 and 10.28. It was agreed with SNH (meeting 19/05/10) that while it is possible to calculate the frequency of occurrence of various plume heights, the frequency of visibility of such plume heights cannot be quantified and therefore a ZVI of visibility of the plume height is of limited value. Information on plume size will be submitted with the full Section 36 Application. Chapter 10 'Landscape and Visual' includes a general discussion of the plume characteristics. A review of the cumulative plume context of the area and a ZTV of average and maximum length of plume is included within this chapter. The presence of the plume in the views from representative locations is included in Section 10.10. The ZTV covers a radius of 30 km. A number of photomontages have been prepared, as appropriate.

Consultee	Identifier	Consultee Comment	Response
	SNH17	4. Assessment of Cumulative Impacts When assessing cumulative impacts please refer to SNH's guidance, which although specifically designed for windfarms covers a lot of common issues. For the cumulative assessment we would expect the following to be included: 1. Base plan showing all four biomass plants, and all consented, or in application power stations/biomass plants and other tall buildings within a 30km radius from each of the sites. 2. A CZTV analysis showing; a series of separate CZTV's (Cumulative Zones of Theoretical Visual Impact), prepared in conjunction with each of the most relevant individual developments, in combination with LCT and designation boundaries, with each cross referenced to reasons in the accompanying text and tables. 3. A selection of appropriate viewpoints, which have been selected from draft CZTV's with input from relevant local authorities and SNH. These should be accompanied by photomontage/wire line as appropriate. – we will be happy to comment on them after the CZTV's are produced.	A base plan showing the three biomass projects on the Forth is included as Figure 8.1b. All three Renewable Energy Plant's proposed for the banks of the Forth are included on the CZTV Figure 10.28. It was agreed with SNH (meeting 19/05/10) that due to the distance of the Dundee project from the other Forth Energy projects that cumulative assessments with this was not required. The cumulative viewpoints have been discussed with SNH (phone call of 25th June). Wireframes and photomontages have been included as appropriate.
	SNH18	4. A description and assessment of the nature and significance of cumulative visual effects. 5. A description and assessment of the nature and significance of cumulative landscape effects, through consideration of effects on landscape character, designations, sense of scale and other relevant criteria.	Please see Sections 10.7 (paragraphs 10.7.55 to 10.7.76) and 10.10 (Table 10.25) to of Chapter 10 'Landscape and Visual'.
	SNH19	Designated sites: The updated site maps received from Forth Energy on 12 March appear to indicate that the 'areas of search for required cooling water infrastructure' fall largely within the intertidal zone. From pre-scoping discussions we understood that all intake and outfall pipes would have to be located below Mean Low Water Springs to allow the operation of the cooling systems throughout the tidal cycle. The maps for Rosyth, Leith and Dundee show the 'areas of search for required cooling water infrastructure' to be subtidal, as expected. Any water discharges directly onto the intertidal area, or within the narrow channel of the River Carron, could potentially have a more significant effect on intertidal ecosystems (part of the Firth of Forth SPA) than subtidal discharges. The ES will need to clarify this issue.	Cooling water will now be abstracted from the Western Channel and discharged to the River Carron on a falling tide i.e. twice a day for four hours. The impact of any water discharges on intertidal ecosystems is addressed as part of the aquatic ecology assessment presented in Chapter 13 'Aquatic Ecology'.

Consultee	Identifier	Consultee Comment	Response
	SNH20	Landscape and Visual: The proposal is situated within the 'Coastal Margins' landscape character type within the Stirling to Grangemouth LCA. However due to the height and relative bulk of the development and according to the ZTV (Figure 7), it is likely to impact upon the Coastal flats, Coastal Hills, Lowland Hills and Valleys, Hill Fringes, Coastal Margins, River Valleys, Plateaux and Lowland Hills and Fringes Landscape Character Areas. We agree with the viewpoints identified by the developer. Other viewpoints that should be considered include: 1. Tulallan Castle 2. Dunimarle Castle 3. Dunmore Park / The Pineapple 4. Union Canal at Polmont 5. A706 – Within AGLV 6. Plean Country Park 7. Kilsyth Hills (within AGLV) 8. Stirling Castle 9. Wallace Monument These viewpoints (VP's) are based on known sensitivities and the ZTV within the scoping report. Within the ES it would be helpful if the viewpoints were superimposed onto the ZTV's, this will allow a quick comparison to be made between VP and potential visibility. The above VP's may be scoped out should they appear to have no theoretical visibility, (It was difficult to compare between the ZTV and viewpoint locations figure). As there has not been a draft CZTV produced, we can't at this stage identify appropriate VP's for the cumulative assessment. These are likely to be similar to the viewpoints already selected, however other viewpoints may become apparent after draft CZTV's are produced. We would be happy to comment on Cumulative viewpoints once the CZTV's have been produced.	Landscape Character Areas have been considered and are shown in Figure 10.4. SNH agreed (phone call of 25th June) that the Registered Historic Gardens and Designed Landscapes (Tuliallan Castle, Dunimarle Castle and Dunmore Park / The Pineapple) can be discussed within the LaVIA under their designated status and that either sufficient views exist from nearby viewpoint locations to adequately describe the visual amenity or else that the sites are not visually sensitive due to intervening vegetation or other features The following five additional viewpoints have been included: Union Canal at Polmont (View 15). A706 (within the AGLV) View 16). Kilsyth Hills AGLV (View 17). Stirling Castle (View 18) The Wallace Monument (View 19). Plean Country Park has not been included, as subsequently agreed with SNH (phone call of 25th June), as it is considered that views are not likely from this location and will not be significant at this distance. A cumulative ZTV is included as Figure 10.28.
	SNH21	Site Layout Issues: We understand that there is a wind energy proposal adjacent to the biomass site. The developer should ensure that these elements work and relate well to each other. This should be part of the design statement.	Forth Energy is considering a wind turbine development within the Port of Grangemouth. While this has been the subject of a scoping request, the site layout for the proposals have not been finalised and it is not therefore possible to assess the cumulative effects of the wind turbines with those of the Renewable Energy Plant at this stage. It is therefore proposed that these cumulative effects be considered at the time of the preparation of the ES for the wind turbine development.

Consultee	Identifier	Consultee Comment	Response
	SNH22	Cumulative Issues: We have concerns over the potential for the Biomass plant in Grangemouth to form a 'gateway' with Longannet Power Station from Sensitive viewpoints such as the Wallace Monument and Stirling Castle. We would like a Cumulative ZTV to be produced for both stack heights together, to ascertain the extent that they will be viewed together and viewpoint assessment to be conducted from the Wallace Monument and Stirling Castle. This ZTV should go out to 30km radius due to the nature of the landform and the sensitivity of these views.	The potential cumulative impacts of the 3 proposed Renewable Energy Plants at Grangemouth, Rosyth and Leith are illustrated as both a 2d ZTVI and as a selected wireframe views where potential views of all three projects are indicated. Longannet Biomass Plant is also considered with respect to cumulative issues.
Scottish Environment Protection Agency (SEPA)	SEPA1	We consider that the following key issues should be addressed during the EIA process: • Good air quality • Energy recovery and efficiency • Protection of people and property from flood risk • Protection of the marine environment • Impacts during construction and operation	Please see: Good air quality - Chapter 9 'Air Quality' Energy recovery and efficiency – Combined Heat and Power Feasibility Study Protection of people and property from flood risk – Appendix F Flood Risk Assessment Protection of the marine environment - Chapter 13 'Aquatic Ecology' Impacts during construction and operation - throughout the ES, where relevant
	SEPA2	We note that the applicant indicates that an appropriate assessment as defined in the Conservation (Natural Habitats, etc) Regulations 1994 (as amended) may be required due the nature of the development. We recommend that any screening assessment, and if required, appropriate assessment be undertaken in a coordinated fashion as allowed under Regulation 52 of the Regulations.	Appendix E 'Terrestrial Ecology Supporting Information' will include a report entitled 'Information to Inform a Habitats Regulations Assessment' in the full Section 36 submission.
	SEPA3	Alternatives and site selection: A description of the main alternatives considered such as alternative sites, alternative technologies and alternatives for the proposed development within site should be included in the ES. The description must include the main reasons for the choice made, taking into account the environmental effects of the decision. The site selection assessment should show the consideration given to locating the proposed development adjacent to potential users of heat and power.	Please see Chapter 6 'Site Selection and Consideration of Alternatives'. The proximity to potential users of heat and power was a key differentiator in the choice of site.

Consultee	Identifier	Consultee Comment	Response
	SEPA4	Energy Recovery: Energy Recovery: Article 6 of the Large Combustion Plan Directive (LCPD) also requires that new or substantially expanded thermal installations undertake a CHP feasibility study. The Scottish Government directed SEPA in the Pollution Prevention and Control (Combustion Plant) (Scotland) Directions 2007 to give effect to relevant provisions of the LCPD (including Article 6) in any permit granted to any such installation. To address this requirement we expect developers to undertake and submit a Combined Heat and Power (CHP) feasibility study. Energy Recovery: The feasibility study should include the development of a heat and power plan which follows the requirements as specified in Annex 2 of our Thermal Treatment of Waste Guidelines 2009. Energy Recovery: If the proposal is classified as a combustion activity, then Article 6 of the LCPD requires the technical and economic feasibility of the use of CHP to be undertaken and this should form part of the ES.	Please see the 'Combined Heat and Power Feasibility Study'. A heat plan is included in the above study and follows the requirements of Annex 2.
	SEPA5	Fuel Types: It is essential that the applicant makes clear at the earliest opportunity whether the proposed facility will burn any waste materials such as treated timber. This will enable the proposed facility to be designed to meet the correct environmental standards and legislative requirements. Clarity about fuel types is required at the time of the application for the Section 36 Consent so that we can be in a position to inform the Scottish Government as to whether the proposed Renewable Energy Plant is capable of being consented under the relevant environmental legislation.	The proposed fuels are described in paragraph 6.5.1 of Chapter 6 'The Proposed Development'. Treated timber is included in the list.
	SEPA6	Fuel Types: Depending on the types of fuel burned and the final design of the facility, any PPC permit granted by us will include the appropriate requirements of the Council Directive 2001/80/EC on the limitations of emissions of certain pollutants into the air from large combustion plant or EC Directive 2000.76/EC on the incineration of waste or both. We can only grant a PPC permit for such an installation where the applicant has demonstrated compliance with these regulations and that the installation will operate in accordance with Best Available Techniques (BAT).The ES should therefore include information demonstrating that BAT (Best Available Techniques) is proposed. We do not expect a full and complete BAT justification at the planning stage. However, sufficient information should be provided to allow us to take a view on likely consentability of the proposed development under our pollution control regimes.	BAT is discussed in Chapter 7 'Site Selection and Consideration of Alternatives' with respect to: Combustion technology Cooling technology and Particulate abatement. Chapter 6 'The Proposed Development' and the mitigation detailed in the impact assessment chapters demonstrate that the proposals will constitute the Best Available Techniques.
	SEPA7	Air quality: The ES or planning submission should include an assessment of baseline air quality in the area of concern, focusing particularly on the air quality objectives outlined in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Consideration should also be given to the potential effects of the proposed development on air quality, during both the construction and operating phases, focusing particularly on whether the development will result in any of the air quality objectives being exceeded or will contribute to exceedences already taking place. This should include any effects directly related to energy production from biomass and also any indirect effects such as transport of materials. Assessment can involve monitoring or modelling, or a combination of these. If any potentially negative effects on air quality are identified, the ES or planning submission should also propose appropriate mitigation measures to deal with this.	Please see Chapter 9 'Air Quality'.

Consultee	Identifier	Consultee Comment	Response
	SEPA8	Air quality: The likely impact on local air quality will be considered by Scottish Ministers within the context of the Section 36 application in accordance with Scottish Executive Technical and Policy Guidance on Local Air Quality Management (LAQM). It will be necessary to consider the cumulative effect of point source emissions, fugitive emissions (e.g. wood fibres) and existing background levels to ensure that no air quality objective is likely to be breached as a result of emissions from the development. Further information is available from the LAQM pages on the Air Quality Archive website and from the National Society for Clean Air at www.airquality.co.uk/archive/index.php and www.nsca.org.uk/pages/topics and issues/air quality guidance.cfm.	Please see Chapter 9 'Air Quality'.
	SEPA9	Air quality: The information used in the ES should be as accurate and as complete as possible. We understand that not all design issues will have been resolved at the ES stage, but to avoid unnecessary duplication of work it is advantageous to ensure that as a minimum the emission data used is as robust as possible. This may also avoid delay in consenting if for example a substantially revised or updated air quality impact assessment is required for PPC permitting purposes.	Acknowledged.
	SEPA10	Air Quality: The ES should include an assessment of the impact from emissions including (but not restricted to) particulate matter (including the PM_{10} and $PM_{2.5}$ fractions as a minimum), oxides of nitrogen, carbon monoxide, water (plume visibility), plus acid and nutrient nitrogen deposition. The assessment should also be clear about how uncertainty is dealt with (for example with future emissions data). Where there is no statutory threshold (standard or guideline) available with which to compare concentrations the chosen comparator must be justified.	These parameters are addressed. The maximum likely emissions limits are proposed in order that the environmental impact assessment is robust. Should more stringent limits be agreed with SEPA at the PPC permit application stage then revised air quality modelling will be undertaken.
	SEPA11	Air Quality: The ES must also address potential impacts on ecosystems as well as human health. A human health impact assessment (HHIA) using a methodology acceptable to us. Sensitive receptors used in assessing the impact of emissions must be clearly identified. This should include: • Consideration of the impact of humans living or working in any nearby tall buildings; • The cumulative impact on local air quality in the area taking into account other significant emissions nearby; • Emissions from traffic in the area both during the construction and operational phases of the project; • Proposals for any new developments such as housing, industrial developments, wind turbines and agricultural developments; • Consideration of impacts on sensitive ecological sites. The guidance contained in the H1 methodology for PPC BAT and impact assessment indicates that an initial assessment of impacts in an area within a 15km radius of the site may be appropriate. However, assessment of impacts on ecological sites may need to extend significantly beyond this.	All aspects are included as part of the air quality assessment in Chapter 9 'Air Quality'. See also response to SNH3.
	SEPA12	Air Quality: The assessment should contain the base assumptions used including, but not limited to, the assumed release rates of substances from the proposed plant. Given that the plant is not proposed to be operational until 2014 the appropriate maximum emission limit values for key pollutants would likely be those currently suggested to form part of the proposed Industrial Emission Directive as well as the applicable indicative Best Available Technique (BAT) standards given in the European BAT Reference document for large combustion plants, incinerators and co-incinerators.	The emission limits used in the dispersion modelling were discussed with SEPA at a meeting on 25/2/10.

Consultee	Identifier	Consultee Comment	Response
	SEPA13	Air Quality: We recommend that the dispersion model should not be used in a fixed manner; i.e. estimated height only but used as a tool to look at several height options to determine the optimum height as well as taking into account all possible factors which may interfere with dispersion.	A stack height selection study (Appendix C) has been undertaken assessing several height options. Sensitivity analyses have been undertaken with respect to the selected stack height (Appendix C).
	SEPA14	Air Quality: The meteorological data used to represent the local area should be carefully chosen and justified; for example ensuring that any potential coastal/estuarine and terrain influences are accounted for. Advice on suitable data can be obtained from the Meteorological Office. Given the number of issues to be considered in realistically modelling emissions from the proposed plant (these include the impact of nearby tall buildings, estuarine location, terrain effects) the applicant may wish to consider the use of two air dispersion models to ensure the predicted pollutant levels are realistic.	Meteorological data from Edinburgh Gogarbank, the nearest monitoring station with the comprehensive data needed for the assessment. Wind speed and direction data from the Falkirk Council's anemometer at Grangemouth Municipal Chambers has been used to complement this. A sensitivity analysis using the AERMOD model was also undertaken (Table 9.17 and paragraph 9.7.55).
	SEPA15	Air Quality: Any impact assessment should also include other potential sources such as emergency relief devices. It should not be limited to the combustion gases from the main stack.	There are no emergency relief devices that emit anything other than steam.
	SEPA16	Cumulative impact: We recommend that the proposed development is assessed in terms of the cumulative impact of any other industrial or waste management proposals in the vicinity. The ES should detail what measures will be taken to mitigate any cumulative impacts. Local Authority Environmental Officers should be contacted at the earliest opportunity to obtain the most recent data relating to air quality.	Paragraphs 9.7.80 to 9.7.87 of the ES address cumulative air quality impacts.
	SEPA17	Noise and vibration: Information on noise and vibration from the operation of the plant should also be included within the ES. As with other aspects of the PPC Permit, the requirement will be for the applicant to demonstrate that working methods proposed represent the Best Available Techniques (BAT) for control of noise and vibration from the installation. Impact on local sensitive receptors will be a key factor in assessing the BAT justification with the overall aim being to prevent, minimise and render harmless noise and vibration emissions. Guidance on the control of noise from PPC Installations is available on the SEPA website.	The methodology for the noise assessment has been agreed with SEPA.
	SEPA18	Noise and vibration: In general terms the information needed for PPC purposes, and which we consider appropriate as a basis for the ES, falls under the following headings: • Identification of key noise sources; • Identification of potentially significant sources of vibration (not just those from construction activities); • Inherent noise emission levels and character (e.g. tonal, intermittent, impulsive) of each key source; • Abatement techniques proposed; • Prediction of level at, and impact on, sensitive receptors; • The potential impact of foreseeable circumstances causing malfunction or non-operation which may lead to an increase in noise and vibration emissions, e.g. emergency vent release; • Proposals for on-going noise and vibration management including complaint procedures, acoustic specification within procurement policies and noise monitoring; and • Identification of other significant local sources e.g. roads, other industries, aircraft.	Please see Chapter 11 'Noise and Vibration'.
	SEPA19	Noise and vibration: The ES will also need to assess the impact of other activities, such as vehicle movement on the site as well as shipping, in respect of the noise environment.	It has been agreed with SEPA (12/05/10) that shipping would be excluded from the ES.

Consultee	Identifier	Consultee Comment	Response
	SEPA20	Flood Risk: The site should be assessed for flood risk from all sources in line with Scottish Planning Policy (SPP) 7 Planning and Flooding and Draft Scottish Planning Policy (SPP).	The is 'Flood Risk Assessment' in Appendix F has considered the requirements of SPP.
	SEPA21	Flood Risk: As the site is a Brownfield site, mitigation measures may be limited to land raising to provide adequate flood free finished floor levels, and flood resilient design. The development should be free from coastal flood risk up to the estimated 1 in 200 year water level with an allowance for storm surge and wave action. .	This has been addressed in the 'Flood Risk Assessment'.
	SEPA22	Flood Risk: The flood risk assessment (FRA) should be carried out following the guidance set out in the Annex to the SEPA Planning Authority flood risk protocol. Our Technical flood risk guidance for stakeholders outlines the information we require to be submitted as part of a FRA, and methodologies that may be appropriate for hydrological and hydraulic modelling. The Scottish Government will need to determine whether an allowance for climate change is also required.	This has been addressed in the 'Flood Risk Assessment'.
	SEPA23	Protection of the marine environment: We expect the environmental statement to address the potential cumulative impacts from temperature and entrainment on fish, migratory species, invertebrates and habitats, and appropriate mitigation to minimise any negative effects.	This is addressed in Chapter 13 'Aquatic Ecology'.
	SEPA24	Protection of the marine environment: With regard to cooling water abstraction the ES should include drawings showing the precise location and design of the cooling water intakes (CW) and discharge infrastructure in the marine environment.	SEPA has agreed (meeting 12/05/10) that as the precise location and design of the cooling water intake and outfall will not be known until the detailed design stage, general information, principles of design and strategies only would be provided in the ES.
	SEPA25	It should also assess the effects of this on the physical entrainment of fish. The use of biocides in cooling water to restrict algal growth should also be detailed.	This is addressed in Chapter 13 'Aquatic Ecology'.
	SEPA26	Protection of the marine environment: With regard to section 2.1.1 on marine non-native species, clarification of the protocols to be followed to ensure that no marine non-native species are introduced into adjacent coastal waters during the operational phase should be included in the ES. Ships should carry and implement a ballast water management plan. Guidance can be found on the IMO website (http://www.imo.org/home.asp) and on the Maritime and Coastguard website (http://www.mcga.gov.uk/c4mca/mgn_363.pdf). It might be useful for the developer to refer to the joint SOAEFD, DoT/MSA and SNH collaborative project which sampled ballast water docking at Scottish Ports (Macdonald, E. and Davidson, R. 1997. Ballast water project - final report, spring 1997. Fisheries Research Services Report No. 3/97. Aberdeen: MLA).	All ships will be required to comply with international legislation. It has been agreed with SEPA (12/05/10) that shipping would be excluded from the ES.
	SEPA27	Protection of the marine environment: The proposed Marine Modelling/Dilution assessment approach is less detailed than the Air Modelling approach. This should be expanded in the ES. Typically, we would expect applicants to demonstrate that the discharge will undergo adequate initial dilution (50 times minimum initial dilution as a 95 percentile) and comply with any concentration limits at the edge of the mixing zone. We recommend that the applicant submits a detailed method statement to us (oceanmod@sepa.org.uk) during the application process.	A method statement has been forwarded to SEPA and the comments received have been incorporated.

Consultee	Identifier	Consultee Comment	Response
	SEPA28	Protection of the marine environment: There is a need to ensure that UKBAP species and habitats are included in the assessments so that they are not omitted from any mitigation measures proposed. . The full list of Priority UKBAP Species and Habitats can be found on http://www.ukbap.org.uk/NewPriorityList.aspx. UKBAP habitats and species of particular importance within the Firth of Forth and Firth of Tay include: ■ Salt marsh; ■ Sea grass beds; and Native Oysters (Ostrea edulis) living populations of which have been recently found in the Firth of Forth http://www.marlin.ac.uk/speciesfullreview.php?speciesID=3997.	BAP species and habitats are considered in Chapter 13 'Aquatic Ecology'.
	SEPA29	Protection of the marine environment: It may be useful to consult the Marine Life Information Network (MarLIN) as well as the NBN Gateway as the quality of the data differs for the locations of these features. On top of this MarLIN gives 'sensitivity' and 'recoverability' information for marine species and habitats for various physical factors including temperature. This information will help hone effective mitigation methods for these features.	MarLIN and NBN Gateway have been consulted.
	SEPA30	Waste minimisation: Details of how waste will be minimised at the construction stage should be included in the ES which demonstrate that: • Construction practices minimise the use of raw materials and maximise the use of secondary aggregates and recycled or renewable materials; • Waste material generated by the proposal is reduced and re-used or recycled where appropriate on site (for example in landscaping not resulting in excessive earth moulding and mounding). There may be opportunities to utilise surplus soils for sustainable purposes elsewhere. To do this effectively all waste streams and proposals for their management should be identified, including peat and other materials excavated on site and the importation of any waste materials to the site. Accordingly, we recommend that a site specific site waste management plan is developed to address these points. This is in accordance with the objectives of Scottish Planning Policy and the National Waste Plan which aim to minimise waste production and reduce reliance on landfill for environmental and economic reasons.	Please see paragraphs 6.5.76 to 6.5.84 of Chapter 6 'The Proposed Development'. It has been agreed with SEPA (meeting 12/05/10) that a Site Specific Site Waste Management Plan could follow as a condition of a Section 36 consent (if granted), in order that it can be prepared at the detailed design stage when a Contactor has been selected.
	SEPA31	Environmental management: A key issue for us is the timing of works. Timing should be planned to avoid construction of roads and other potentially polluting activities during periods of high rainfall. The ES or supporting information must therefore identify which periods of the year construction activities will be undertaken in line with best practice, taking into account the need to avoid pollution risks and other environmental sensitivities affecting operational timing, such as fish spawning and bird nesting. We can provide useful information such as rainfall and hydrological data through our Access to Information Team.	The timing of the works was discussed with SEPA at a meeting on 12/05/10. It was agreed that mitigation measures would be included in the ES that are robust enough to cope with such a scenario, rather than constraining the timing of construction due to heavy rainfall.

Consultee	Identifier	Consultee Comment	Response
	SEPA32	Environmental management: Mechanisms should be set out to ensure that workers on site, including sub-contractors, are aware of environmental risks and undertake proposed preventative/mitigation measures. Consideration should be given to site presence of an appropriately qualified environmental scientist during construction to provide specialist advice. The principles of this should be considered within the ES.	It has been agreed with SEPA (meeting 12/05/10) that rather than employing 'an appropriately qualified environmental scientist during construction to provide specialist advice', a suitably trained Environmental Manager would be part of the construction staff and would be able to call upon a team of appropriately qualified scientists covering range of disciplines when needed.
	SEPA33	Environmental management: The production of an environmental management plan (EMP) along with detailed method statements may be required by condition or, in certain cases, through environmental regulation. We therefore recommend the submission of an outline EMP with the ES which incorporates the principles of all proposed pollution prevention and mitigation measures.	It has been agreed with SEPA (meeting 12/05/10) that an EMP could follow as a condition of a Section 36 consent (if granted).
	SEPA34	Drainage: Proposed temporary and long-term foul drainage facilities for workers on site must be described in the ES. Details of the proposed on-site treatment system, along with an assessment of the potential environmental impacts should be included. Guidance and best practice advice can be found in PPG4 Disposal of sewage where no mains drainage is available. We also request the submission of a site drainage strategy, detailing methods for the collection and treatment of all surface water runoff from hard standing areas and roads using sustainable drainage principles, which should be shown on a site plan.	SEPA has agreed (meeting 12/05/10) that as detailed design of drainage facilities will not take place until receipt of Section 36 Consent (if granted), a general description only would be provided in the ES.
	SEPA35	Drainage: Surface water drainage arrangements of elements such as any new access roads and buildings should incorporate the attenuation (where appropriate) and treatment principles of sustainable drainage systems (SUDS). The SUDS treatment train should be followed which uses a logical sequence of SUDS facilities in series allowing run-off to pass through several different SUDS before reaching the receiving water body.	It has been agreed with SEPA (meeting 12/05/10) that a comprehensive SUDS (and in particular infiltration systems) was not appropriate to a port location, adjacent to a major river. However aspects of SUDS such as oil interceptors and sediment traps would be applicable and these will therefore be incorporated into the project where appropriate.
	SEPA36	Pollution prevention: We request that a dedicated pollution prevention section is provided in the ES. All potential pollution risks associated with the proposals and all aspects of site work that might impact on the environment should be systematically identified, as well as preventative measures and mitigation. The principles of any relevant PPGs should be incorporated into proposals rather than just referenced. Particular attention should be paid to the construction PPGs.	Please see Chapter 19 Pollution Prevention.
	SEPA37	Pollution prevention: Construction works can increase the risk of water pollution due to the release of sediment from exposed surfaces, contaminant discharges and accidental spillage. There is also potential for pollution of the estuarine/coastal waters from silt, oil spills and chemicals. Steps must therefore be proposed to ensure that works do not cause oil, mud, silt, aggregate material or concrete to be washed away either during construction or as a result of subsequent erosion, vehicular movement or maintenance works at the site. Details of all operations involving water usage should be specified, and we encourage the use of a closed cycle system for site water needs. Concrete batching on site may require authorisation and should be discussed with us at an early stage.	This is addressed in Section 14.6 of Chapter 14 'Hydrology, Hydrogeology, Geology and Soils', which outlines pollution prevention mitigation measures.

Consultee	Identifier	Consultee Comment	Response
	SEPA38	Pollution prevention: Proposals for water quality monitoring must be set out in the ES. The proposals should include a requirement that such monitoring generally be carried out at least six months before the commencement of any construction works to establish minimum baseline data. Our regulatory teams can advise on the likely monitoring regime that will be required for those aspects of the development that will be regulated under CAR.	It has been agreed with SEPA (meeting 12/05/10) that reference will be made to end of pipe monitoring such as oil in water monitors or visual checking of silt/sediment traps as appropriate, rather than a programme of ambient water quality monitoring.
	SEPA39	Storage of fuel and oil: If the storage, transport or dispensing of fuel or oil is proposed then a detailed scheme addressing location, management, maintenance, contingency measures and inspection should be included in the ES, which demonstrates full compliance with the Water Environment (Oil Storage) (Scotland) Regulations 2006. The scheme should incorporate the best practice advice contained in PPG 7 Refuelling facilities and PPG 8 Safe storage and disposal of used oils.	SEPA has agreed (meeting 12/05/10) that this information will not be known until the detailed design stage, general information, principles of design and strategies only should be provided in the ES.
	SEPA40	There may be contamination issues associated with historical port activities. Please be advised that the local authority has the responsibility to ensure that land affected by contamination is assessed and remediated as appropriate. We therefore draw your attention to the ES requirements requested by the local authority in respect of contaminated land.	Acknowledged – please see Chapter 14 'Hydrology, Hydrogeology, Geology and Soils'.
	SEPA41	Pollution Prevention and Control (Scotland) Regulations 2000 (PPC): the applicant should provide sufficient information at the Section 36 stage to allow us to comment on whether or not the proposal is capable of being consented under the Pollution Prevention and Control (PPC) Scotland Regulations 2000.	SEPA (meeting 12/05/10) has since confirmed that the ES should contain information relating to each of the aspects of the PPC application (e.g. energy efficiency, emissions control, monitoring etc). This has been addressed throughout the ES.
	SEPA42	Pollution Prevention and Control (Scotland) Regulations 2000 (PPC): This proposal must be considered in terms of extant environmental legislation.	Acknowledged.
	SEPA43	Pollution Prevention and Control (Scotland) Regulations 2000 (PPC): Dependent upon the types of fuel burnt and the final design of the facility, any permit granted by us, will include the appropriate requirements of the Council Directive 2001/80/EC on the limitations of emissions of certain pollutants into the air from large combustion plant or EC Directive 2000/76/EC on the incineration of waste or both. The ES should include information demonstrating that BAT is proposed. As noted above regarding the likely availability of information on design etc; we do not expect a full and complete BAT justification at this stage. However, sufficient information should be provided to enable us to take a view on likely consentability of the proposed development.	Please see response to SEPA6.
	SEPA44	Pollution Prevention and Control (Scotland) Regulations 2000 (PPC): Our preference would be that all the technical information required for all permissions and licences is submitted at the same time as the Section 36 application. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further application and/or variation to the Section 36 consent.	Acknowledged.

Consultee	Identifier	Consultee Comment	Response
	SEPA45	Oil Storage Regulations: It is not necessary for oil storage facilities to be registered with SEPA however applicants should ensure compliance with the Regulations. Proposals for oil storage facilities should be located and designed in accordance with the Technical Handbooks and the Water Environment (Oil Storage) Regulations (Scotland) 2006. Due to potential risk to the environment, underground oil storage should be avoided.	Acknowledged.
	SEPA46	Port of Grangemouth - Air quality: Falkirk Council has assessed air quality in the area with respect to the national Air Quality Standards (NAQS) and has declared an Air Quality Management Area (AQMA) for SO_2 encompassing Grangemouth petrochemical complex and adjacent areas, indicating that the levels of pollutant are expected to exceed the 15 minute mean objective. Please note that the compliance date for the 15 minute objective was 31 December 2005, therefore the levels of this pollutant are exceeding the NAQS.	Acknowledged – please see Chapter 9 'Air Quality'.
	SEPA47	Port of Grangemouth - Air quality: Falkirk Council has been monitoring air quality in Grangemouth since 2001 and it has commissioned numerous annual assessments of local air quality in this area. We therefore suggest that the applicant discuss this proposal with Falkirk Council's Environmental Protection Unit at the earliest opportunity.	Falkirk Council's Environmental Protection Unit were contacted and they helpfully provided the required air quality monitoring information.
	SEPA48	Port of Grangemouth - Air quality: Falkirk Council has shown that the local meteorological data may differ from data for the Gogarbank site, and this may affect the modelling results. We recommend that the developer discuss this matter with Falkirk Council's Environmental Protection Unit, at the earliest opportunity.	Falkirk Council's Environmental Protection Unit were contacted and they helpfully provided the required meteorological data.
	SEPA49	Port of Grangemouth - Air quality: The ES for Grangemouth should also take into account other significant emissions nearby such as the Grangemouth Refinery operated by Ineos Manufacturing Scotland Limited, traffic and shipping.	SEPA has confirmed that emissions data for Grangemouth Refinery is not available and cannot therefore be included in the assessment. Traffic has been considered.
	SEPA50	Port of Grangemouth - Flood risk: Due to the location of the proposed development adjacent to the coast. The site is identified as being within the 1 in 200 year (0.5% annual probability) coastal flood envelope on our Indicative River & Coastal Flood Map Scotland). An appropriate 1 in 200 year water level for the area is 4.62 mAOD based on extreme still water level calculations using the POL 112 Method. This does not take into account the potential effects of wave action, funnelling or local bathymetry at this location. The development will also need to be free from the 1 in 200 year flood risk from the neighbouring watercourses the Carron and Grange Burn.	Mitigation recommendations for the site include consideration of safeguarding of sensitive equipment and providing adequate drainage infrastructure. The site datum for safety of personnel and positioning of sensitive equipment will be at a minimum level of 5.5 m AOD. The 5.5 m AOD level is defined by the still peak water level and an allowance for climate change over the course of the development, plus a 600 mm freeboard allowance.
	SEPA51	Port of Grangemouth - Protection of the marine environment: Consideration needs to be given to the proposed positioning of the cooling water intakes in the narrowest part of the estuary. The cumulative effects of locating the proposed cooling water intake location opposite the Longannet Power Station intake (2km) should be included in the ES. Consideration should also be given to cumulative impact of the proposed plant at Rosyth and other proposals for a biomass plant at Longannet/Kincardine. The ES should also consider the potential impacts of any diadromous species which migrate up the River Carron.	Acknowledged – Please see paragraphs 13.5.23-27 and 13.7.37-39 of Chapter 13 'Aquatic Ecology'.

Consultee	Identifier	Consultee Comment	Response
BAA Airports (BAA)	BAA1	The Grangemouth site is outside BAA's area of concern so the site will have no impact upon Edinburgh Airport.	Acknowledged
	BAA2	In relation to building/roof design, it is important that the building/roof structures are designed so that they are unattractive to birds.	Acknowledged.
	BAA3	In relation to landscape design, to avoid the need for modifying proposals at full planning stage, it is suggested that developers consult with the Aerodrome Safeguarding team at a preliminary stage.	Acknowledged
	BAA4	Additional comments relate to general advice set out in Advice Notes 3 - 8. These Advice Notes need to be taken account of.	Acknowledged
Defence Estates (DE)	DE1	The current proposed development falls outside of an Ministry of Defence Statutory Safeguarding zone (MOD) and therefore does not have a detrimental impact on MOD operations.	Acknowledged.
	DE2	A revised safeguarding plan for RAF Leuchars is currently under review and will capture this development once it has been published and consequently may affect the future development of this site.	Acknowledged.
	DE3	The flue stack may require aviation warning lighting in the interests of air safety. Defence Estates Safeguarding acknowledges that the heights and locations of the stacks may change throughout the consultation process and should be consulted once elevation and location plans have been finalised to ascertain whether lighting will be required.	Defence Estates has since confirmed that aviation warning lighting is not needed for this development with respect to MOD procedures.

Consultee	Identifier	Consultee Comment	Response
Grangemouth Community Council	GCC1	Grangemouth as a community already carries a heavy environmental burden in support of industries identified as being of strategic/national importance with the prospect of more to come if proposals identified in the recent National Planning Framework 2 (NPF2) document come to fruition. The development of a renewable energy plant within the port may be of economic and environmental value on a national level but when set alongside existing and proposed developments deemed to be of national importance the cumulative environmental effect on the local environment will be negative unless best available technology solutions are implemented to overcome identified environmental issues. Throughout the report there is a thread that implies that as the location is already industrialised and subject to significant levels of HGV traffic the impact of the proposed development will not be significant. We have extracted two statements from the report as examples: a) Extract from paragraph 6.7.4 "Will not have any significant impact on the local road network during its operational phase". Given the likelihood that anything from 10-30% of the fuel supply (1.3 million tonnes/annum) may be delivered by road we find this statement optimistic based on current identified problems at junction 6 of the M9. b) Paragraph 6.2.17 "The appearance of the plant, it's massing and finishes will be carefully considered at the detailed design stage, with the intention of creating a building that is in keeping with the local area". The community does not want more identifiable industrial structures our back yard has enough. Neither of these statements leads us to believe that what is being proposed will bring any environmental improvement to our community with respect to visual impact or atmospheric pollution arising from road transport. We understand that the scoping report is intended to guide the Environmental Impact Assessment (EIA). On that basis we wish to make it clear that the EIA should recognise the importance of delivering a positive local environmental impact which should not be outweighed by perceived national environmental gains.	The EIA is an impartial process that takes into consideration all potential significant environmental impacts. The Transport Statement has confirmed that there will be no significant impact on the local road networks. Only up to 10% (by energy content) of the 1.5 million tonnes will travel to site by road. The proposals will also present opportunities for renewable heat to be used in existing business, industrial and community facilities, and the potential to incorporate this in future development initiatives, and to the benefit of the local community.
Health and Safety Executive (HSE)	HSE1	The environmental statements should not include measures which would conflict with the requirements of the Health and Safety at Work etc Act 1974 and its relevant statutory provisions.	Acknowledged.

Consultee	Identifier	Consultee Comment	Response
Historic Scotland (HS)	HS1	The ES should address the predicted impacts on the historic environment and describe the mitigation proposed to avoid or reduce impacts to a level where they are not significant. Historic environment issues should be taken into consideration from the start of the site selection process and as part of the alternatives considered. Both direct impacts on the resource (listed building or SAM) itself and indirect impact on its setting must be addressed in any Environmental Impact Assessment (EIA) undertaken for this proposed development. In terms of possible effects, we would ask that an assessment of the level of impact is made of those sites listed in the baseline description of the scoping report.	This is addressed in Chapter 15 'Cultural Heritage'. The site selection study (see Chapter 7 'Site Selection and Consideration of Alternatives') considered the historic environment as one of a number of criteria.
	HS2	In terms of assessment methodology, as the application boundary is tightly defined we would suggest that the impact of the development on the setting of the historic docks in general is considered. We do not support distance thresholds in assessing impact rather you should consider assessment of sites that have intervisibility with the site.	The Historic Docks have been assessed as a group for setting impacts. Cultural heritage sites within the Zone of Theoretical Visibility have been considered for impacts on their setting. The approach taken was discussed and agreed with Historic Scotland in a meeting that took place on 23/02/05.
	HS3	In terms of potential impacts on a wider scale, given the height of the proposed stack involved in the development you may also wish to cross refer to the landscape and visual assessment to consider any wider potential impacts on the cultural heritage of the area. The viewpoints listed for the LVA will also provide the tools for this assessment.	This has been addressed.
Linlithgow Angling Club	LAC1	Terrestrial Ecology: Ash pollution, noise pollution and pollutants washing into the surrounding waterways and estuary would need to be carefully monitored.	Potential impacts on terrestrial and aquatic ecology have been addressed (Chapters 12 and 13 respectively). Comprehensive monitoring programmes will be in place and agreed with SEPA and Falkirk Council. There will be no long term storage or disposal of ash on site.
	LAC2	Estuarine Ecology: If using water from the River Carron as a cooling water source would this not have ecological significance on the river e.g. impede on migratory fish movement, lower water levels?	Water will not be abstracted from the River Carron. Water will be abstracted from the Western Channel and discharged to the Carron. The impact of this discharge is assessed within Chapter 13 'Aquatic Ecology'.
Marine Scotland - Aquatic Environment (MS-AE)	MS-AE1	A Marine Licence may be required come the time of application (the new Marine Licence will incorporate Part II of the Food & Environment Protection Act, 1985 and section 34 of the Coast Protection Act, 1949 (CPA) and will come into effect in 2011).	Acknowledged.
	MS-AE2	You should also be aware that the Scottish Government has recently established an Inshore Fisheries Group for the south east area.	The Inshore Fisheries Group will be consulted at the application stage.

Consultee	Identifier	Consultee Comment	Response
	MS-AE3	The Environmental Statement (ES) should cover the following categories of effect - direct / indirect, secondary, cumulative, short, medium and long-term, permanent and temporary and positive and negative effects. Forecasting methods used to assess the main effects along with a description of the measures envisaged to reduce / prevent / offset any significant effects that the project and regulated activity are likely to have on the environment should be documented. The main alternatives and the reason for choice along with the effects, of those chosen, on the environment should also be outlined.	Please see Chapter 13 'Aquatic Ecology' and also Chapter 7 'Site Selection and Consideration of Alternatives'.
	MS-AE4	Although a full traffic survey may not be required, consideration should be given to the impacts on shipping during the estuarine works and what mitigation measure will be proposed to prevent any hazards to navigation or even damage to pipelines with regards to the CPA. These can be included under Transport, Traffic and Access in the ES.	Forth Energy has consulted the Port of Grangemouth (including Forth and Tay Navigation Service) who has confirmed that the cooling water infrastructure will not be in or impact upon a navigation channel. . The Harbour Authority will be required to consent to any marine works. British Waterways are currently being consulted.
Marine Scotland - Freshwater Lab	MS –FL1	The proposed development could potentially have an impact on fish and fisheries through the entrainment of fish, thermal changes in the water, plant discharge including biocide in the water, noise and site disturbance.	Please see Chapter 13 'Aquatic Ecology'.
	MS –FL2	The report states that the abstraction infrastructure will be constructed according to guidance issues by SEPA. This infrastructure should also comply with the Salmon (Fish Passes and Screens) (Scotland) Regulation 1994 and the Salmon (Fish Passes and Screens) (Scotland) Amendment Regulations 2003 ensuring no mortality or injury to fish and that fish passes and screens are maintained at all times.	Acknowledged.
	MS –FL3	The possible effects of heat discharge on fish should be considered in addition to regulations covered by The Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR).	Please see Chapter 13 'Aquatic Ecology'.
	MS –FL4	The impacts of plant discharge including biocides and the potential release/disturbance of contaminants from soil into the estuary should also be assessed in relation to water quality and its effect on fisheries. The developer will be required to carry out a water quality monitoring programme in the development area.	Please see Chapter 13 'Aquatic Ecology'. Water quality monitoring will be agreed with SEPA at the PPC application stage.
	MS –FL5	The report does not state where ash is to be deposited if market demands do not meet the supply. A full assessment of water quality and fish issues, if applicable, will be required prior to any deposition of ash being carried out.	Ash will be either recycled or deposited in licensed landfill. There will be no associated impacts on marine ecology.
NATS En-Route	NATS1	If any changes are proposed to the information supplied to NERL in regard to this application (including the installation of wind turbines) which become the basis of a full, revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.	Acknowledged.

Consultee	Identifier	Consultee Comment	Response
NHS Scotland (NHSS)	NHSS1	The Environmental Statement needs to include significant detail and breadth on potential effects on human health, in view of the need to describe impacts on population. This must include impacts in the short term to long term covering threshold and non-threshold effects and in particular needs to assess in detail potential effects on human health including (but not restricted to) those in relation to: • Air quality, including particulate and other emissions to air, and potential effects on the surrounding residential areas; • Noise effects on surrounding human populations; • Effects arising from an increase in road transport in the area as a result of the plant.	These effects, including those from road transport, are assessed in Chapter 9 Air Quality, Chapter 11 Noise and Vibration.
	NHSS2	Cumulative effects on the local community would need to be considered, and effects relating to construction, operation and decommissioning should be included.	These are addressed through the ES, where relevant.
	NHSS3	It is especially important that detailed description is provided of the health effects of projected and modelled exceedances of air quality standards are made explicit for nearby residents.	Please see Chapter 9 Air Quality. The ES will be available at a number of locations within Falkirk and can also be downloaded from Forth Energy's website.
	NHSS4	Detailed assessment of all of the above effects needs to include modelling and methods need to include a Health Impact Assessment (HIA) using an agreed methodology with key consultees, in particular the Dundee City Council, the Scottish Environment Protection Agency and NHS Tayside.	An assessment of human health impacts was undertaken as part of the air quality assessment as described in Chapter 9 'Air Quality'.
Scottish Enterprise (SE)	SE1	We suggest Forth Energy that clarifies the source and nature of the biomass to be used on site to ensure sustainability of supply, and whether this might be in conflict with other bio-energy plants in the UK (e.g. Port Talbot).	Please see the Sustainability Statement.
	SE2	Given the heat and power requirements of private and public consumers at and around all four sites, we believe that there is further potential for distributed energy projects in the shape of combined heat and power and district heating.	Acknowledged, please see CHP Feasibility Study.
	SE3	We suggest that the further development of the proposed projects pay due regard to the development of the National Renewables Infrastructure Plan and in particular, the impacts on the potential for wider renewable energy development (e.g. offshore wind and marine) at the sites in Dundee and Leith. It should be noted that a Strategic Environmental Assessment is currently being carried out as part of the development of the National Renewables Infrastructure Plan.	Please see the Planning Statement.
	SE4	In light of the large scale of the plants, we suggest it would be helpful for Forth Energy to provide further information on any new infrastructure requirements in order to accommodate the proposed plants.	The electrical connection will be underground as described in Section 6.4. The electrical connection is addressed where relevant in the ES (please see Chapters 12, 14 and 15).

Consultee	Identifier	Consultee Comment	Response
Scottish Right of Way and Access Society (ScotWays)	SRoW1	The National Catalogue of Rights of Way shows that the asserted right of way CF97 is affected by one of the two areas of search identified for the required cooling water infrastructure at the proposed Grangemouth Renewable Energy Plant. I have enclosed a map with the route highlighted in orange. Without having clear detail of the plans for the Cooling Water Infrastructure needed by the Renewable Energy Plant, it is difficult to assess the significance of the above development upon the right of way. We are especially interested in whether there is any possibility of this right of way being used for access to any works undertaken. We ask that the right of way remains open and free of obstruction both during and after any development.	This footpath is no longer within the red line boundary and will not be impacted by the proposals.
The Civil Aviation Authority (CAA)	CAA1	In respect of any potential aerodrome related issue, I have few associated observations other than to highlight the need for the appropriate planning authority to check any safeguarding maps lodged with the authority to identify any aerodrome specific safeguarding issues. In relation to aerodromes, it would be sensible to establish the related viewpoint of the licensee of Dundee Airport.	The reference to Dundee Airport is understood to relate to the Dundee Renewable Energy Plant rather than that proposed for Grangemouth. The closest airport to Grangemouth is Edinburgh Airport (24 km). BAA Safeguarding (Edinburgh Airport) has been consulted and has responded that the site is outside their area of concern and the project will have no impact upon Edinburgh Airport. Please see Chapter 17 Aviation and Telecommunication Systems.
	CAA2	Dependent on the height of the structures, there might be a need for aviation warning lighting.	There is no requirement for warning lighting – please see Chapter 17 Aviation and Telecommunication Systems.
	CAA3	In relation to gas venting and/or flaring, the SR does not appear to mention whether the power station would vent or flare gas either routinely or as an emergency procedure such as to cause a danger to overlying aircraft. It is assumed that it would not. If that is not the case parties are invited to use myself as an appropriate point of contact for any further related discussion.	There will be no venting or flaring of gas.
	CAA4	There is a civil aviation requirement in the UK for all structures over 300 feet high to be charted on aviation maps. Should this development progress and the 300 feet height be breached, to achieve this charting requirement, developers will need to provide details of the development to the Defence Geographic Centre.	Acknowledged – please see Chapter 17 'Aviation and Telecommunications Systems'.
	CAA5	In relation to Military Aviation, the Ministry of Defence position in regards to the proposed development and military aviation activity should be established.	The Ministry of Defence has been consulted and have no concerns.

Consultee	Identifier	Consultee Comment	Response
The Coal Authority	TCA1	Records indicate that the site lies within the coalfield. Although the Coal Authority would not object in principle to the proposal, any past coal mining activities and presence of coal within the site should be fully considered within the Environmental Statement, along with mitigation measures to ensure the development is not subject to coal mining related land stability or other public safety hazards. The ES should consider: - the location and stability of abandoned mine entries - the extent and stability of shallow mine workings - outcropping coal seams and unrecorded mine workings - hydrogeology, mine water and mine gas - whether Coal Authority permission will be required to intersect, enter, or disturb any coal or coal workings during site investigation or development works.	Grangemouth is within a Coal Authority area where a mining search is required. A Coal Mining Report was acquired on 28th June 2010 to confirm the ground conditions with regards to potential coal workings beneath the site. The report confirms there are no known records to indicate that the Coal Measures beneath the site have been worked in the past, present or licensed to be worked in the future. There are no mine entries on site or directly adjacent to the site. There are no records of mine gas emissions requiring action by the Coal Authority. Therefore, the risk of Coal Workings beneath the site having an effect on the proposed development is considered to be low.
The Royal Society for the Protection of Birds (RSPB)	RSPB1	Biomass plants should aim for maximum efficiency and that fuel crops should not be planted on land with significant biodiversity interest.	Please see the Combined Heat and Power Feasibility Study for expected efficiencies. The Sustainability Statement addresses the sourcing of fuels. It is Forth Energy's intention to comply with Renewable Energy Directive which requires that "*Raw material should not come from high biodiversity value areas, from the conversion of high-carbon stock areas, or from undrained peatland*." Forth Energy also intend to ensure that all the forest-derived fuels used are certified by an internationally accepted sustainability certification system such as Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), with the aim of sourcing all such fuel from certified forests. Forth Energy is confident that complying with these standards will address the key sustainability concerns related to biomass fuel supply.

Consultee	Identifier	Consultee Comment	Response
	RSPB2	The sustainability statement should include a detailed assessment of how the sustainability of the proposal's operations will be ensured and optimised. The following issues will require particular attention: a. Certification of biomass feedstocks The sustainability statement should give further details of how the fuel will be sourced. We would recommend that all fuel is certified to ensure that feedstock is sourced from sustainable forestry with high standards in regards to impacts on biodiversity, soils, water resources, air quality and livelihoods, including impacts from land use change, and that feedstock can be readily traced to its producer. In particular, the sustainability statement should state whether the certification includes an assessment of the impact of growing the feedstock on biodiversity, and if not, consider how Forth Energy will assess the potential impacts of a particular source of biomass on biodiversity. In order to ensure and to demonstrate that the energy produced is environmentally sustainable, we strongly recommend only using feedstock from sources certified by the Forestry Stewardship Council (FSC). b. Contribution to climate change mitigation The sustainability statement should also include a detailed carbon balance for the proposal. This should be designed to provide a robust assessment of the saving and/or increase in greenhouse gases that the proposal is likely to make. This should be achieved by carrying out a full life-cycle analysis of the woodchip production process, including the carbon emissions produced by land clearance, forestry cultivation and the transportation of feedstock to the Dundee Port Plant, as well as the Plant's operation itself. As the precise proportion of feedstock sources remains uncertain at this stage (P15), it would be useful to provide carbon balances for a range of different potential scenarios. 3. Carbon Capture Readiness It is our view that developers should endeavour to minimise the overall carbon emissions resulting from any biomass proposal and that the feasibility of carbon capture technologies on such a proposal should be explored further. 4. Heat We would like to see how the developer has considered the possibilities for different uses of heat generation and details of how they intend to realise this. The Heat Plan should show how site selection has influenced the potential for the use of waste heat and should include outline costs for the installation and operation of any infrastructure.	Please see the Sustainability Statement.

Consultee	Identifier	Consultee Comment	Response
Transport Scotland (TS)	TS1	In considering trunk road impacts, it is expected that information will be provided on the wider impact of development related traffic where this may be appropriate together with the requirements for consequent mitigation. The Environmental Statement should provide information relating to the preferred route options for the movement of heavy loads and anticipated construction staff movements via the trunk road network during the construction period. In addition, information must be supplied identifying potential environmental impacts on the trunk road once the development is operational, together with appropriate mitigation measures.	Please see the Transport Statement and ES Chapter 18 'Traffic and Transport'.
	TS2	Potential trunk road related environmental impacts such as noise, air quality, safety etc should be assessed. In the case of the Environmental Statement the methods adopted to assess the likely traffic and transportation impacts on traffic flows and transportation infrastructure, should comprise: • Determination of the baseline traffic and transportation conditions, and the sensitivity of the site and existence of any receptors likely to be affected in proximity of the trunk road network; • Review of the development proposals to determine the predicted construction and operational requirements; and • Assessment of the significance of predicted impacts from these transport requirements, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.	Please see the Transport Statement and ES Chapter 18 'Traffic and Transport' and also Chapter 9 'Air Quality' and Chapter 11 'Noise and Vibration'.
	TS3	Impacts to sensitive receptors associated with noise and vibration arising from the proposed development during the construction and operational phases should be considered. Operational traffic noise and construction traffic noise should be assessed by considering the increase in traffic flows and following the principles of CRTN.	Please see Chapter 11 'Noise and Vibration'.
	TS4	The Environmental Statement should consider potential impacts to identified trunk road receptors, in terms of: • Predicted noise levels from construction traffic; and • Any increases to road traffic attributed to the Proposed Development.	Please see Chapter 11 'Noise and Vibration' and Chapter 18 'Traffic and Transport'.
	TS5	Where a significant change in road traffic characteristics has been identified as a result of the proposed development, changes in air quality at a worst case sensitive receptor adjacent to the trunk road will require further assessment (based on specific criteria set out in the scoping response - see full response for details). In the air quality assessment, a conservative approach should be utilised and traffic changes screened against both sets of criteria; if a road link triggers any of the criteria it should be assessed further. Where significant changes in traffic are not noted for any link, no further assessment need be undertaken.	Please see Chapter 9 'Air Quality'.

Consultee	Identifier	Consultee Comment	Response
	TS6	Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report: • The work that has been undertaken e.g. Transportation, Noise, Air Quality Assessments etc; • What this has shown i.e. what impact if any has been identified; and • Why it is not significant. It is not necessary to include all the information gathered during the assessment of these impacts, although this information should be available, if requested.	Acknowledged.
West Lothian Council (WLC)	WLC1	We would like to be consulted on the Rosyth proposal as well as it is closest to the West Lothian boundary. Fuel types and fuel sourcing is a concern given the annual volume required, land-take implications, proximity to West Lothian, and the potential impacts locally, and exported to other countries. More information is required on fuel types, sources and their potential environmental impacts and should be provided in the Environmental Statement.	Please see the Sustainability Statement.
	WLC2	What would happen if cargo/freight prices for shipping solid fuels to the UK from abroad rose to unaffordable levels? Have life-cycle analysis and lifetime costing forecasts been undertaken to identify the limits of this renewable technology and the project's long-term viability? Has this work been done and is it proposed to be undertaken? This level of information should be made available through the Environment Impact Assessment process so that stakeholders can have confidence in the sustainability and viability of the proposed technologies and processes.	Please see the Sustainability Statement. It is not until the project has both received Section 36 Consent (if granted) and achieved financial close that contracts for the supply of biomass will be put in place. Forth Energy has studied the current biomass market and has information on future trends and in this regard is confident that there will be biomass supplies for the life of the project. Forth Energy would not be investing in this project if this were not the case.
	WLC3	Concern is raised over the significant levels of investment that are being targeted for sites at or near sea level. The proposed sites need to be secure and protected, appropriate to the level of public investment and the longevity of the project. Have the dangers from tide surges, increasingly erratic weather events and rising sea levels been assessed? These assessments should be included in the ES.	Please see the Flood Risk Assessment in Appendix F.
	WLC4	The Council's Environmental health service advises that there are concerns about the deteriorating level of air quality in Linlithgow, notably particulate matter, dust, and general air quality. The ES must include an assessment of air quality indicators for the receptors of human/fauna/flora for the full extents of the biomass plants impact, with mapping and wind direction analysis. If different types of fuel with different environmental impacts are to be used, or substituted, these should be assessed as well.	This is addressed in Chapter 9 'Air Quality'. The combustion technology and the flue gas abatement proposed will ensure that the plant meets the proposed emission limits for all the fuels proposed.

Consultee	Identifier	Consultee Comment	Response
	WLC5	Potential natural environmental impacts for the Firth of Forth estuary and corridor and the northern area of West Lothian are a major concern for the council. West Lothian shares a Special Protection Area with Falkirk Council along the Blackness foreshore area and the ES should assess impacts for both the above and under water environments in these areas. Westerly winds are likely to displace some of the airborne environmental impacts to the West Lothian area. As an authority with a programme to remedy contaminated land, a good record in post-industrial land reclamation, and a participant in river quality management, the authority needs to be reassured that mitigation measures are viable and will avoid and stop impacts on the council area's natural environment. A full assessment of environmental impacts for West Lothian and the viability of mitigation measures proposed needs to be part of the ES.	Chapters 12 and 13 address impacts on Terrestrial Ecology and Aquatic Ecology respectively, including the impacts of atmospheric emissions on designated sites. Impacts on the Special Protection Area are addressed in both chapters and also Appendix E Information to Inform a Habitats Regulation Assessment.
	WLC6	The northern area of West Lothian has the potential to be impacted by airborne pollutants from Rosyth to the north, Grangemouth to the west, and possibly Leith to the east resulting in additional environmental load and impacts. The cumulative impacts of the three plants on this council area need to be assessed. In addition, these new biomass plants would be on and above existing and proposed development in the effected area: what are the anticipated environmental impacts of the exiting British Petroleum plant at Grangemouth over the lifespan of the proposed biomass plants and how will these interact together? Are there other industrial and renewables plants in the offing that would further raise the background airborne pollutant levels - such as significant uptake of domestic and small-scale wood and pellet heating/energy sources, or commercial uptake. The cumulative impacts of the proposed biomass plants in addition to existing and consented/proposed sources of similar environmental impacts needs to be assessed and included in the ES.	Cumulative impacts of the proposed Grangemouth, Rosyth and Leith projects have been modelled, please see paragraphs 9.7.80 to 9.7.87 of the ES.
	WLC7	It is worth mentioning that the proposed biomass plants exhibit similarities to the pulp and paper industry (albeit without chlorination but with combustion) which has many well-known pervasive and displaced environmental impacts: acid rain potential from NOx and SOx, black liquor problem, toxic chemicals like dioxins, phenols, furans etc. The impacts of the biomass energy process need to be fully assessed for toxic and displaced impacts on the surrounding environment.	All relevant flue gas emissions have been modelled in detail including NOx, SOx, acid deposition, dioxins and furans. There will be no emissions of phenols or black liquor discharge.
WWF Scotland (WWFS)	WWFS1	The Environmental Impact Assessment (EIA) for this development must provide a full assessment of the climate change impacts resulting from each of the four proposed power stations and a comprehensive assessment of the alternatives and the greenhouse gas emission reductions that these provide compared to the current development proposal. These alternatives should include operating as combined heat and power plants (CHP) and using Carbon Capture and Storage (CCS) technology. Any such assessment should include a full carbon lifecycle analysis of the fuel source.	Please see the Sustainability Statement and the Combined Heat and Power Feasibility Study. The proposed Renewable Energy Plant is a low carbon technology and it is not therefore proposed to design or build the plant to be Carbon-Capture Ready. The plant is also below the 300 MWe European Union threshold for the consideration of Carbon Capture Readiness. Fitting of carbon capture to the proposed plant would make the project financially unviable.

Consultee	Identifier	Consultee Comment	Response
	WWFS2	The EIA should set out the sustainability criteria applied to sourcing the biofuel and the guarantees in place to ensure these criteria are met. As a minimum the developer should satisfy the proposed EU sustainability criteria and ensure any woody biomass has achieved Forestry Stewardship Council (FSC) certification.	Please see the Sustainability Statement.
	WWFS3	Emissions related to bioenergy production and use should be subject to full carbon accounting to ensure that bioenergy is delivering real climate benefits.	Please see the Sustainability Statement.
	WWFS4	The EIA should assess the environmental impacts arising from the fact that "the majority of the fuel will be procured from overseas" and compare these to the predicted impacts of sourcing as much of the fuel as possible from within Scotland.	Please see the Sustainability Statement.
	WWFS5	WWF requests that the EIA describes the efficiency of the power station in terms of gCO_2/kWh as it is proposed and then assuming the station captured and used the waste heat.	Please see the Sustainability Statement.
	WWFS6	The sites for each of the four plants should be chosen following a heat mapping exercise to ensure they are sited close to sufficient heat demand. The proposed Heat Plan should then set out the required infrastructure and agreement between Forth Energy and the source of the heat demand to supply the renewable heat.	Please see the Combined Heat and Power Feasibility Study and Chapter 7 'Site Selection and Consideration of Alternatives'.
	WWFS7	The EIA should describe the power plant efficiency and practical implications if it were to have CCS (Carbon Capture and Storage) fitted at a future date.	Please see response to WWFS1.
Friends of the Earth (FoE)	FoE1	Friends of the Earth are generally in favour of well sited small scale renewable electricity generation plants. However, it is not clear that this proposal is for such a plant. The EIA focuses on issues arising from the plant's construction (e.g. its impact on the pink-footed goose), rather than on the wider issues regarding the plant. We feel that the wider sustainability issues associated with this proposal are not given sufficient consideration.	Please see the Sustainability Statement. The proposal is for a Renewable Energy Plant fuelled by biomass not an 'incinerator' – see project description. The electricity generated will be eligible for Renewables Obligation Certificates. Only a small proportion of the fuel would be classed as a waste, and this will still also be biomass, for example recovered timber, paper and cardboard. No refuse will be used for fuel.

Consultee	Identifier	Consultee Comment	Response
	FoE2	The following paragraphs describe some of the issues which would need to be considered, in detail, in the Sustainability Statement. Paragraph 3.4.2 says that 70 to 90% of the fuel will be delivered by ship. In order to be renewable these ships would need to be powered by the wind or a renewable fuel (not agrofuel). Paragraph 6.3.21 states that "The additional shipping associated with the project (i.e. in the order of one ship every seven days) is insignificant in comparison to existing and recent historic shipping movements at the port (of the order of 6 sailings per week in 2008). It is not therefore intended to assess emissions from shipping." Assuming the ships are all of the same emissions, for ease of discussion, an increase from 6 to 7 sailings a week is a 17% increase in emissions. This is not "insignificant" and must be evaluated. The fuel not brought by ship would be brought by lorry. Unless these lorries are powered by renewable fuel this process too is not renewable. It is disappointing that with another partly waste wood burning plant being built at Longannet, rail transport of fuel has been pretty much ruled out. Consideration should be given to how both plants, together with the others, could be supplied by rail.	The carbon footprint of the proposals, including shipping and lorry movements, has been calculated and is included in the Sustainability Statement. The Renewable Energy Plant will generate average annual carbon emission savings of 163 kilo tonnes of CO_2e with the life time carbon emission savings of the Grangemouth plant estimated to be approximately 3.2 Mega Tonnes of CO_2e. The carbon intensity of transport by sea (6 gCO_2e/tonne.km) is much lower than the carbon intensity of road transport (86 gCO_2e/tonne.km) or rail (32 gCO_2e/tonne.km) (2009 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting – 2nd Issue'. Defra / DECC: London). Please see responses DCC18 and 12 with respect to rail and the local environmental impact of shipping.
	FoE3	The proportion of operation of the "auxiliary boiler" in paragraph 3.3.1 is not defined. The emissions of this boiler need to be considered.	The auxiliary boilers are anticipated to operate for 12% of the year and their emissions are addressed in section 9.7 of Chapter 9 'Air Quality'.
	FoE5	Paragraph 3.10 seeks to exclude carbon capture and storage. This is very disappointing given talk of making the Forth a centre of excellence for CCS.	Please see response to WWFS1.
	FoE6	Paragraph 1.1.1 talks of "sustainably sourced biomass", but there is nothing in the rest of the document to indicate how and why the fuel is sustainably sourced. Without a thorough investigation of this issue and convincing arguments the plant cannot be claimed to be a renewable one.	Please see the Sustainability Statement.
Scottish Badgers (SB)	SB1	Having now had the opportunity to see the scoping reports in relation to the above proposed renewable energy plants Scottish Badgers find we have no areas of concern regarding the developments. In relation to the above scoping opinions, without prejudice to any further consideration Scottish Ministers may be required to give to the application, we have no comments available which may be considered relevant in regard to water supply, water protection, sewerage or flood prevention.	Acknowledged.

B.3 Gateway Response Table

TableB2 Gateway Comments and Forth Energy's Response

Consultee	Identifier	Topic	Consultee Comment	Response
Scottish Government (SG)	SG-G1	CHP	We are very encouraged that the potential heat use has been identified as up to 200MWth and that it is the intention to include both process use and space heating in the plant design. We note that a plant of this configuration would fit the eligibility criteria for CHPQA and thereby qualify for 2 ROCs. If realised, this level of heat would help in meeting our renewable heat target of 11% by 2020. Presentationally, the study does appear to give a mixed message about the heat intentions. For example, detailed documentation has been submitted on the huge potential at the site and is all very positive. However, at the same time there is also detailed documentation about the barriers and the difficulties in realising the heat potential and that decisions moving forward can only be taken post consent. It would be helpful if FE could consider how best to bring these two elements together to present a more cohesive approach to their heat intention.	Forth Energy has identified a real opportunity to use the volumes of renewable heat at Grangemouth to meet a substantial element of Scotland's renewable heat targets for 2020 and beyond. Scoping of commercial terms to describe the framework within which the project will progress will be undertaken by Forth Energy in collaboration with prospective interested parties. The framework will detail the requirements of each of the projects specific issues (e.g. finance, design etc). It will be necessary to progress heat specific discussions on the security of supply / resilience expectations of prospective commercial heat customers. Such detailed discussions will focus on technical and commercial supply arrangements and associated plant and equipment. All discussions will be progressed in a timely and efficient manner and will be subject to consent to formally engage with interested parties. The supplementary CHP Feasibility report submitted with the Section 36 application for the Grangemouth Renewable Energy Plant provides a detailed description of how this will be achieved

Consultee	Identifier	Topic	Consultee Comment	Response
Falkirk Council (FC)	FCC- G1	Hydrology	At Para 5.15 of the Planning Policy Context section of the Environmental Report the consultants comment that there are no relevant SPGs to the proposal published by the council. This is available on the Council's website. The Council's SPG, Flooding and Sustainable Urban Drainage Systems, is very relevant to the consideration of the proposed plant, which is to be situated in, or close to, the flood plain of the Forth Estuary. Policy ENV4:Coastal Planning and Flooding in the Structure Plan is also omitted from their consideration in the Planning Statement section.	Falkirk Council Flooding and Sustainable Urban Drainage Systems: Supplementary Planning Guidance Note, October 2009. The guidance sets out: • The nature of the folding problems generally and in the Falkirk Council area in particular, the roles and responsibilities of Falkirk Council and other key agencies and the requirements placed on developers to comply with flooding policy when proposing new development. • The requirement for drainage assessments to accompany planning applications for new development. • The Council's requirements in relation to provision of Sustainable Urban Drainage Systems in new development. • The Council's SPG and Policy ENV4 are referenced in Appendix F (Flood Risk Assessment).

Consultee	Identifier	Topic	Consultee Comment	Response
	FC- G2	Cultural Heritage	Built Heritage: There is at least one listed building in very close proximity to the site of the proposed plant, the B listed swing bridge between the Western Channel and Carron Dock. This has not been acknowledged in the submissions. Policy EQ14 of Falkirk Council Local Plan which seeks to preserve the character of listed buildings and any development affecting the setting of a listed building should preserve its character and setting. Indeed there appears to be one part of the proposal, involving a cooling water discharge pipeline, which directly cuts across the swing bridge. While there is some discussion on this issue in the ES it would be appropriate to seek greater comfort than is provided is far on the potential effects of this discharge pipeline proposal on the swing bridge.	The B-Listed swing bridge between the Western Channel and Carron Dock, referred to in the Consultee's Response, is included in the ES where it is described as 'F5: *Swing Bridge, Western Channel and Carron Dock*'. It is first referred to as 'Swing Bridge' in Section 15.4.7 and is formally listed in Section 15.4.12, which deals with Listed Buildings in the study area. It is included in Table 15.7 and Site F5 is also depicted on Figure 15.1. Following the advice of Falkirk Council's Keeper of Archaeology and Local History, the impact on the '*setting of the Carron Docks and the Western Channel of the Grange Dock, with the connecting cut and swing-bridge'* was indeed considered and a detailed assessment was presented in the ES at Section 15.7. This assessed the impact of the scheme on the setting of the Historic Docks; this included the Former Workshop Building, Grangemouth Dock (F4), the Swing Bridge (F5) and the surrounding docks and associated structures. A detailed assessment of setting issues for the Historic Docks is set out in Section 15.7. As noted there, the port comprises a tapestry of structures and features of different ages and styles. The setting of the dock structures is their immediate surroundings and their relationship with one another. There are no notable views into these historic docks; nor are views out of importance. As a group the Historic Docks are considered to be of low sensitivity to impacts on their setting. The proposed Renewable Energy Plant will be a new structure within the area of Grangemouth Docks. However, in keeping with many of the structures here, the Renewable Energy Plant will be an industrial feature requiring a dockside setting and as such it represents a complementary element to the area. It is therefore considered that the proposed Renewable Energy Plant will have an impact of at most low magnitude; an impact of low magnitude on a site of low sensitivity will therefore be of negligible significance on the setting of the Grangemouth Docks. Finally, the Consultee's Response refers to the construction of one of the cooling water discharge pipelines, noting that '*it appears ….to directly cut across the swing bridge*'. However, as noted in the ES at Section 15.4.7, the pipeline works themselves (if Option 1 is followed) will lie under the land/water adjacent to the area of the Swing Bridge (F5) but will not have any direct impacts on the bridge itself. No detailed plans for this construction are currently available but any groundworks here will avoid any direct impact on the fabric of the Listed Building itself.

Consultee	Identifier	Topic	Consultee Comment	Response
	FC- G3	Ecology	The proposal is located very close to the Firth of Forth SPA, which is a European level designated protected area for bird species. Policy EQ24, and confirmed by SNH in their comments on the Scoping Report, state that a Habitats Regulations Assessment is required to assess the effect of any development potentially affecting adversely the biodiversity interest of the Forth SPA. The applicant states the appropriate authority to carry out the assessment is ECU, although they offer the opinion that there will be no adverse effect on the integrity of the biodiversity interest.	Acknowledged - A Habitats Regulations Assessment has been prepared as part of the application and can be found in Appendix E to the ES.
	FC- G4	Policy	Considerable emphasis is given to the provisions within the National Planning Framework 2 for renewable energy projects. At this stage I would comment that while there is clear support in the NPF for enhanced energy infrastructure there is no specific provision for that to be located at Grangemouth. On the other hand the Grangemouth Docks location is included as National Development 5: Grangemouth Freight Hub. This national development is quite specific in listing the elements that should make it up e.g. creation of river berth, better connection to M9 motorway; expanded freight storage and handling facilities, but a biomass power plant is not mentioned. The proposed plant's location is in the middle of the area previously indicated by Forth Ports for the location of new distribution facilities. It could be argued that the current proposal prejudices the fulfilment of the provisions of the National Development. I would suggest they wish address this point in the submissions.	With the exception of the National Developments it is not the role of NPF2 to determine locations for development. Even for the National Developments, it is not the role of NPF2 to identify suitable sites for development. There is a policy commitment to increase the amount of electricity generated from renewable sources significantly, and the planning system will respond to a range of applications in varied locations to fulfil this. There is sufficient land available at Grangemouth to accommodate the proposed National Development and the biomass plant. Forth Energy believes the development of the biomass plant is likely to act as a catalyst for further development, particularly where heat (or cooling) is required. Forth Energy does not therefore see a conflict between the Policy objective of National Development 5 and the biomass plant.
	FC- G5	Landscape	I have reviewed the discussion on landscape and visual impact contained in section 10 of the ES and note the choice of viewpoints. I would concur with the applicant's opinion that only 4 sites would potentially experience significant impacts by the bulk of the plant. The plant would be located within an existing landscape of large industrial structures and I concur with the conclusion that the impact of the plant from those viewpoints will be absorbed by that industrial landscape. However it would be appropriate to ensure that the design of the plant, which will not the subject of this current application, is considered carefully. As the proposal would have a significant visual and physical impact on the site it falls to be considered under Structure Plan policy ENV7 which requires a design quality statement to be submitted. This has been provided by the applicant and will need to be assessed.	Architects have produced a Design Statement Concept which accompanies the Section 36 application and comprises a series of design principles to guide the future detailed design. The application will be subject to conditions, and the development of the plant will not commence until a suitable design has been agreed.

Consultee	Identifier	Topic	Consultee Comment	Response
	FC- G6	Traffic Policy	The requirements of the Structure Plan policy COM5: Developer Contributions, are considered in the draft submissions but the applicant does not consider that the proposal makes any impact on the community which would require mitigation in the areas of Environmental Enhancement, Physical Infrastructure, or Community Facilities. While our transport colleagues are reviewing the project's transport assessment it is surprising, at the very least, that a project of this magnitude would not require to provide mitigation of its impact on the road network while other, smaller projects, in Grangemouth have had to make considerable contributions to roads infrastructure.	The purpose of Policy COM5 is to ensure contributions towards infrastructure required to serve new development – it is predicated therefore on the development placing an additional burden on existing facilities, which may consequently require to be enhanced or upgraded. In the case of the proposed development, it generates very limited additional road movements, which the TA demonstrates can be accommodated by the surrounding road network, and does not generate demand for wider community facilities in the manner in which say, a housing development would. There will be landscaping undertaken at appropriate locations within the site.
Scottish Natural Heritage	SNH-G1	General	Your guidance suggest that consultees should check that all expected information is included, and to highlight any obvious gaps or deficiencies in this information. Consultees are not expected, at this stage, to comment on the quality of the data provided or to assess the application in any detail. We would therefore propose to make a more detailed assessment at the application stage.	No response required.
	SNH-G2	General	In respect of the very limited time available to undertake this gate-checking exercise we offer these comments without prejudice to any comments we may later make in response to the Environmental Impact Assessment and the Report to Inform an Appropriate Assessment.	No response required.
	SNH-G3	General	Environmental Statement, Volume 2: Main Text A general comment is that there appears to be far too much background information of marginal interest and too much discussion of some aspects which could be dismissed with minimal but adequate justification. This results in a much lengthier document than necessary - a shorter more concise ES would be easier to read and could highlight the significant issues better.	The ES has been prepared to be thorough and to comply with the EIA Regulations and technical guidelines. It is has also been prepared based on recent experience of other Section 36 consent applications.
	SNH-G4	Air Quality	Chapter 9 Air Quality - we have not had time to have full feedback on this issue but if there are any concerns we will contact you with the details as soon as possible. 9.7.76 Cumulative Impacts - we note that the cumulative impacts of air pollutants with the other two proposed renewable energy plants on the Forth are yet to be finalised. This will clearly be an important issue to address and one which will probably need to be incorporated into the Report to Inform an Appropriate Assessment.	Acknowledged. Cumulative impacts of air pollutants with the other two proposed renewable energy plants on the Forth have been finalised and discussed in Chapter 9 (Air Quality)., Chapter 12 (Terrestrial Ecology) and the Habitats Regulation Assessment (HRA).

Consultee	Identifier	Topic	Consultee Comment	Response
	SNH-G5	Air Quality and Landscape & Visual	12.8 Cumulative Impacts - we are concerned that these are only considered in relation to the Grangemouth Bio diesel Plant and Longannet Power Station. The other Forth Energy proposed Renewable Energy Plants at Rosyth and Leith should also be considered in any cumulative impact assessments.	The other Forth Energy plants at Rosyth and Leith are now included in the cumulative assessment, see Chapter 9 (Air Quality). Chapter 12 (Terrestrial Ecology) and the HRA. The potential cumulative landscape and visual effects of the proposed Grangemouth Renewable Energy Plant with the plants at Rosyth and Leith are addressed in Chapter 10.
	SNH-G6	Ecology	Habitats Regulations Assessment: Please use the correct Natura terminology throughout, i.e. 'likely significant effect' or ' no adverse effect on integrity' at the appropriate stage. Phrases like 'significant impact unlikely' do not make it clear which Natura test is being considered.	Acknowledged. All sections have been amended to include the correct terminology.
	SNH-G7	Aquatic Ecology	4.2.11 The 20m limit of effect for pile driving would appear to relate only to lethal or injurious effects. Behavioural disruption, e.g. prevention of migratory movement, needs to be assessed. This could potentially occur over a significantly wider area, and should be quantified. It may not be an issue but some quantification is required before ruling it out.	This issue is quantified and discussed in Sub-Sections 13.6.5 – 13.6.12 of the Aquatic Ecology Chapter (13).
	SNH-G8	Ecology	5.3.24 Shelduck have only been considered as a wintering species. However, they are also present as a breeding species in summer and this needs to be taken into account in the HRA (in relation to construction disturbance on the River Carron).	Section 5 of the HRA has been updated. Breeding shelduck is not an SPA qualifying feature. Even if it is assumed that breeding shelduck form part of the SPA wintering population. As shelduck was not recorded within 500 m of the proposed development in the 2009 breeding survey, any effect of the development on breeding shelducks, with a resulting effect on the wintering shelduck population is therefore unlikely.
	SNH-G9	Ecology	6 Assessment of Potential Impacts: Firth of Forth SPA The assessment of potential impacts on four bird species in relation to 'cooling water discharge affecting prey abundance during operation' is based on the assumption that because these bird species do not feed along the River Carron during a falling tide (when the discharges will occur) then no impacts will occur. However, no consideration appears to have been given to whether or not the discharges will have any permanent effect on the distribution and abundance of prey species, and if so whether this will have an effect on the foraging available to birds in this area during other tidal periods. Without this information it cannot be concluded that there will be no adverse effect on the integrity of the SPA in relation to these bird species.	SNH's comment is acknowledged and the HRA and ES Chapter 12 have been amended to consider potential effects on prey species for birds at all states of tide.
	SNH-G10	Ecology / Aquatic Ecology	7.2.4 'In neither case is a significant effect considered likely'. Please use correct Natura terminology, i.e. 'there is no adverse effect on integrity' if this is what is meant. If there was no likely significant effect then there would have been no requirement to carry out an appropriate assessment.	Sub-section 13.3.9 details how the correct terminology is used in the remainder of the Aquatic Ecology Chapter (13). the HRA has been updated with the required terminology.

Consultee	Identifier	Topic	Consultee Comment	Response
	SNH-G11	Ecology / Aquatic Ecology	7.2.4 'Although a thermal plume extends the length of the Carron estuary, birds do not feed within the Carron Estuary in significant numbers and no significant impact on the conservation objectives of the SPA is therefore likely.' This is different from the conclusions stated earlier which said that birds do not feed along the Carron on the falling tide. The data suggest that they do not feed along the Carron at other times, in which case the effects of the discharges on prey abundance and distribution should be considered.	SNH's comment is acknowledged and the HRA and ES Chapter 12 have been amended to consider potential effects on prey species for birds at all states of tide.
Scottish Environment Protection Agency (SEPA)	SEPA- G1	General	In respect of our interests, we are satisfied that the information provided in the draft Environmental Statement (ES) meets the requirements that we set out in the scoping opinion.	No response required.
	SEPA- G2	Air Quality / Ecology / Aquatic Ecology	Notwithstanding this, we have identified a few minor information gaps which should be addressed prior to submission of the final ES. These issues are outlined in the attached annex and relate to air quality, cumulative impact in relation to designated habitats and the modelling of the cooling water discharge.	No response required.
	SEPA- G3	General	It should be noted that our check of the ES did not include any review, assessment or evaluation of the information presented. We simply cross referenced the draft ES against the comments submitted in our scoping response. As a consequence there is a chance that we may require clarification or further information once we have had the opportunity to undertake a detailed review of the application once it has formally been submitted.	No response required.
	SEPA- G4	General	The applicant may wish to consider the following points prior to submitting the formal application. We accept that we may have overlooked one or more of the below noted items during our initial read through as the application is lengthy and complex and it may have already been addressed within the application.	No response required.
	SEPA- G5	Air Quality	Annex: Additional Information for the Applicant 1. Air Quality	No response required.

Consultee	Identifier	Topic	Consultee Comment	Response
	SEPA – G6	Air Quality	We are satisfied that the draft ES has addressed the main issues in terms of the air quality assessment. However, it does not appear to have considered how the proposed energy plant might contribute to the high levels of sulphur dioxide that can exist during still conditions, leading to exceedences of the 15-minute objective for sulphur dioxide at several locations within the Grangemouth area (this is well documented in the air quality reports that have been produced by Falkirk Council).The ES should therefore more clearly highlight the additional impact of the plant in regards of the 15 minute objective for sulphur oxide we recommend that you re-examine the use of double the long term impact as the background figure. 1.1 You need to consider whether or not this figure is sufficiently conservative when taking into account the existing breaches of Air Quality Standards.	All of these aspects are addressed in Chapter 9 (Air Quality).
	SEPA-G7	Air Quality	It is important to note, that the Municipal Chambers monitoring station recorded 17 exceedences of the 15 minute threshold value in 2009 and 12 exceedences in 2010. 1.2 Whilst the 15 minute air quality objective was not exceeded at this location in 2009, it has been exceeded in the Grangemouth area, every year since 2001 (with the exception of 2005 and 2006); for this reason, Falkirk Council designated as AQMA in 2005.	Acknowledged.
	SEPA-G8	Air Quality	1.3 Table 9.8 contains reference to chromium IV, we assume that this is a typo and should read as Chromium VI.	It is confirmed this was a typo and has been corrected.
	SEPA-G9	Ecology	2 Habitats Information	
	SEPA-G10	Air Quality / Ecology	We note that the information on the cumulative effects in relation to designated habitats is missing from the draft ES. To inform the appropriate assessment the cumulative impacts of the development will need to be considered in relation to all other plans or projects in the public domain which are known to emit similar pollutants and which are not yet operational. As a minimum this should include the other Forth Energy REPs, the Grangemouth Bio diesel plant, and the developments at Longannet.	This is now addressed in Chapter 9 (Air Quality), Chapter 12 (Terrestrial Ecology) and the HRA (Appendix E6).

Consultee	Identifier	Topic	Consultee Comment	Response
	SEPA-G11	Air Quality / Ecology	Further information should also be provided on the nutrient-N and acid deposition effects at the raised bog SACs identified in the Habitats section, but screened out in the Air Quality section. This should include further justification to support the statement that there will be no impact on designated sites beyond 15km.	The nutrient-N and acid deposition effects at the raised bog SACs are now included in Chapter 9 (Air Quality), Chapter 12 (Terrestrial Ecology) and the HRA (Appendix E6). Changes in air quality and deposition have been considered at all designated sites within 15 km. The potential to impact on sites outside this distance was also considered in Chapter 9. Section 9.7
	SEPA-G12	Aquatic Ecology / Hydrology	Marine Modelling	
	SEPA-G13	Aquatic Ecology	The draft ES does not fully consider the characteristics of the tidal Carron in the modelling of the cooling water discharge. Unlike the Forth Estuary, the tidal Carron is not a well mixed system and is therefore more complex to model. We therefore recommend collecting the site specific data e.g. salinity, temperature, water level and water flow for the area of the channel where the discharge points are proposed.	We think we can show that the discharge with diffusers will mix rapidly over a range of physical conditions, including the conditions we envisage. However, the CORMIX model shows with the Carron flowing with freshwater only that the plume will sink and touch the seabed. This is not desirable and we do not believe it would actually occur as it seems unlikely that there would be freshwater at the discharge point. . Field data has been collected from the Carron estuary and found it not to be thermally stratified and its salinity is influenced by the freshwater input of the River Carron. The measured flows were found to be consistent with the estimates used. The models were rerun taking the field derived values into account.
	SEPA-G14	Aquatic Ecology / Hydrology	Process and domestic effluent discharges are described in Chapter 14 - hydrology, hydrogeology and soils. Sections 14.6.25-14.6.30 describes the process effluents that will be discharged into the tidal Carron. 14.6.30 states that these are assessed in more detail in Chapter 13 but this only seems to consider thermal discharges.	As detailed in sub-section 14.9.26 domestic sewage will be discharged to the local sewerage system or via a package treatment plant (e.g. a biocube) prior to discharge to the dock by the cooling water discharge system.
	SEPA-G15	Aquatic Ecology	Densities between ambient waters and discharge waters differ. According to Webb and Metcalf (1987) the Forth estuary can vary between a well mixed and partially mixed state. It is unclear whether or not this characteristic has been taken into account for the discharge location in the tidal Carron, and what the salinity is at the discharge location is. Table 1 below shows different conservative density scenarios for the tidal Carron. The differences in density between ambient and discharge waters are quite significant and should have been taken into account in the calculations. The discharge plume is very dense and is likely to sink to the bottom of the channel decreasing the dispersion rate.	This was taken into account during the Aquatic Ecology Assessment. The assertion that the plume would "likely sink to the bottom" is incorrect as the diffusers will ensure it rapidly mixes. The model has been rerun using the salinity values obtained from field sampling.

Consultee	Identifier	Topic	Consultee Comment	Response
	SEPA-G16	Aquatic Ecology	The ES should consider the dispersion of the density plume between the two proposed discharge locations and the mudflats in the Forth Estuary. In particular, the affect of the hyper slaine water on the mudflats and ecology of the channel and neighbouring skinflats is not clear. In addition to this, it is also not clear whether or not the structure (training wall/breakwater) at the mouth of the Carron will effect plume dispersion.	The Aquatic Ecology Chapter (13) considers the dispersion of the hypersaline plume onto the mud flats. The purpose of the modelling is to show that the discharge will be rapidly mixed within a few metres and therefore there will be no hypersaline plume on the mudflats.
	SEPA-G17	Aquatic Ecology	Figures 13.3-13.5 in relation to the outputs from the CORMIX modelling are difficult to read. We understand that these will be enlarged to aid visualisation in the finalised ES. It would be helpful if similar plots can be provided for salinity.	The Figures have been enlarged and reproduced in Volume 5 (Figures) of the ES.
	SEPA-G18	Aquatic Ecology	Section 13.5.16 states that 'At about 250m from the discharge ports the plume has spread across the entire width of the river although the temperature and salinity by this point are close to ambient. 'If possible, we would welcome the inclusion of salinity results for this point in the ES.	Cormix does not produce plots of salinity, but deals with dilution factors. As over the time scales involved the temperature is a conservative pollutant (not decaying) the salinity and temperature will be correlated. A reduction of 50% in temperature will also reduce the salinity by 50%.
	SEPA-G19	Aquatic Ecology	Section 13.5.13 states that the cooling water discharge rate will be 0.933m3s-1. This will exceed the 0.575 m3s-1 flow rate which occurs in the River Carron during low flow conditions. It is not clear how the thermal plume will disperse under low flow and low tide conditions shortly before the cooling water discharge ceases. The section states that the average volume this decreases to as low tide approaches and how significant this will be with regard to a reduction in the dispersion.	As it is not planned to discharge at low tide, modelling at this state of the tide is not required. We have taken some measurements in the River Carron during the probable discharge window and present them within Chapter 13 (Aquatic Ecology). .
	SEPA-G20	Aquatic Ecology	The seventh bullet point in this section 13.5.16 states that the outfall is positioned close to the seabed which is 5m deep relative to chart datum. However, Table 13.2 shows depths ranging from12.3 to 14m depth. It is not clear from the draft what depth the outfall will be positioned at.	There is a lack of clarity as to the depth of the discharge. In part this is because we do not have a chosen site for the discharge and any engineering detail including information as to how far above the sea bed the diffusers would be mounted etc. which needs to be completed at the detailed design stage. The section near field effect of temperature rise on aquatic life in the River Carron Estuary has been modified to clarify the situation and is presented in Chapter 13. .
	SEPA-G21	Aquatic Ecology	Section 13.5.18 in the aquatic ecology chapter states that modelling has been carried out using visual plumes to simulate dispersion of the plume during high water. This does not show how the plumes to simulate dispersion of the plume during high water. This does not show how the plume will disperse during worst case conditions i.e. during slack conditions at times of flow water. It would also be helpful if modelling outputs e.g. contour plots could be produced to show the extent of the plume in the estuary.	1) We have produced contour plots for the discharge using CORMIX. 2) As we understand it, there will only be a discharge for 4 hours, so there will be no discharge at slack low water. This has been stated more clearly in the revised Chapter 13.

Consultee	Identifier	Topic	Consultee Comment	Response
Forestry Commission (FC)	FCS-G1	General	FCS has not been able to get sight of the Developers' proposals for Grangemouth; therefore these comments are based on a general understanding of the proposals. The key points for further information from the Developers are: • Recognition of the important role that the Scottish Government sees for biomass in development of local heat and meeting Scotland's renewable heat target • Efficient use of a finite resource • The Grangemouth plant's fuel demand potentially displacing indigenous wood fibre from existing forest industries and the emerging local heat market • Long term security of supply issues for imported fibre in a relatively immature but fast growing global market for biomass • Cumulative impact of the Developers' proposals for 4 power stations.	The points listed by FCS are covered in the Sustainability Statement submitted with the Section 36 Application
	FCS-G2	Policy	Reference is made to FCS' previous comments on the Dundee check which highlighted key aspects of Scottish Government policy on biomass and energy. The following comments are made. Scottish Government Guidance on thermal power stations in Scotland Developers should additionally refer to Scottish Government Guidance on thermal power stations in Scotland (March 2010) and address the key issues therein.	The points listed by FCS are covered in the Sustainability Statement submitted with the Section 36 Application

Consultee	Identifier	Topic	Consultee Comment	Response
	FCS-G3	CHP Policy	Page15 of this guidance is set out below for ease of reference. "Using biomass for energy offers a number of benefits and, if properly planned, it can be considered a low carbon and sustainable option. 3.17 The biomass heat and power sector has a small but significant role to play as part of the overall energy mix and in contributing towards our renewable electricity and heat targets as set out in: Scotland's Renewables Action Plan (Scottish Government 2009) http://www.scotland.gov.uk/Resource/Doc/278424/0083663.pdf Scotland's Renewable Heat Action Plan (Scottish Government 2009) http://www.scotland.gov.uk/Publications/2009/11/04154534/15 3.18 Sources of biomass include virgin wood, certain energy crops, industrial wood residues, marine algae, and certain agricultural residues. 3.19 Given that much of the biomass resource is located off the gas-grid where displacement of fossil fuel heating systems will have the greatest carbon benefit, biomass will have a particularly important role to play in meeting renewable heat targets.	These documents have been used to inform the development of this project and reference is made to them throughout the Section 36 Application documentation as appropriate.
	FCS-G4	CHP Policy	3.20 On efficiency grounds, the Scottish Government would particularly like to see biomass utilised for heat-only or for combined heat and power plant, while accepting that there will also be a continuing role for stand-alone electricity applications in certain circumstances. 3.21 In terms of scale, it is anticipated that new biomass plant will be relatively small in scale, both to optimise local supply and, where heat is deployed, to serve localised heat markets. Indeed, whilst biomass is a renewable resource, there is also a finite supply of sustainable biomass available at any one time, and a limited indigenous supply. Without utilising the potential for heat deployment within biomass power plants there is a risk that larger plants will use the available biomass resource in a way that does not use whole energy content effectively, and Scotland could therefore fall short of its renewable heat target."	Acknowledged. This guidance has been taken into account in the preparation of the Section 36 Application and supporting information and including where appropriate in the CHP Study and Planning Statement.

Consultee	Identifier	Topic	Consultee Comment	Response
	FCS-G5	Policy	Scottish Government - General Biomass Scoping Advice Developers should also refer to the Scottish Government's General Biomass Scoping Advice. In respect of forestry, the Advice notes that Developers should consider the finite nature of domestic supply; the potential demand on the Scottish and UK harvest from the proposed project; issues around energy security when proposing to use imported fibre; and sustainability issues.	This quote is acknowledged.
	FCS-G6	Sustainability	If the Developers have not already done so, it would be helpful for the Developers to set out the fuel supply scenarios clearly in their documents together with the reasoning around these scenarios to provide greater clarity to the proposals; and to consistently refer to these scenarios throughout the documents. It would also be helpful for the Developers to set out clearly the overall efficiency of the proposed plant for the production of electricity and heat.	This quote is acknowledged and the fuel supply scenarios and the overall efficiency of the proposed Renewable Energy Plant are detailed in Chapter 6 (Project Description), the CHP Study and the Sustainability Statement accompanying this application.
	FCS-G7	Sustainability	The Developers may suggest energy forestry including Eucalyptus species as a future resource but it should be noted that there will be no volumes available for at least 12 years and the ability to sources large volumes from the UK in the medium term is uncertain.	For clarity the text has been amended in the Sustainability Statement and Chapter 6 of the ES.
	FCS-G8	Sustainability	The Developers should provide greater comment on how they will ensure that their need for domestic fibre will not displace the needs of the existing forest industries.	Forth Energy believes there is an opportunity to develop indigenous supply chains in addition to existing supply chains.

Consultee	Identifier	Topic	Consultee Comment	Response
	FCS-G9	Sustainability	Security of fuel supply is a key consideration, particularly given; the significant volumes sought (including cumulatively from all proposals); the relatively long life span of the plant; the relatively immaturity of the global woodfuel market; the volatile nature of the existing global market for woodchip for pulp and paper; and the anticipated huge increase in international demand for biomass. To provide greater clarity around issues of displacement, sustainability, and security of supply, it would be helpful if the Developers provided more information on the likely sources for both the indigenous and imported wood fibre and publish any advice and reports obtained. It is understood that the Developers have obtained an independent assessment of woodfuel supply prospects and it would be helpful if this was published (subject to commercial constraints) to provide confidence in long term supply arrangements.	Forth Energy is developing supply chains on an ongoing basis and will be publishing their findings as they become available. Forth Energy expects to provide data showing that the volume of fuel required for it's projects is a very small percentage of the global resource available and that there is good prospect that an increasing volume of material can be supplied from indigenous sources without impacting on existing markets.
	FCS-G10	Sustainability	The issues highlighted above will be magnified by the cumulative impact of up to four Forth Energy biomass plants with a combined total of 500 MWe (at 30% indigenous material this would be around 1.5 million tonnes). Developers should therefore comment on the potential cumulative impacts, in particular the impact on both imported and indigenous supply; potential displacement issues within the existing forest industries; and the impact on the role of biomass in delivering local, renewable heat.	Initially, Forth Energy does not anticipate there to be significant volume from indigenous sources. However, they would seek to develop suitable supply chains once the project has been established. In addition, please refer to the response to FC-G9 above.
	FCS-G11	Socio	We note the information provided on jobs that the project will bring both in the construction and operational phases. Scottish Ministers are particularly keen to see wider benefits for communities from renewable energy schemes more generally. For example for wind project, the norm is for developers to offer the local communities a "community benefit" by way of a sum per MW of renewable electricity generated. The money is usually held in a specific fund to support local projects. We would be interested to know if FE's has any plans along similar lines.	Historically, wind projects have been seen to bring little benefit to local communities, in terms of jobs and economic activity, whilst they can have a significant visual impact. Community benefit payments have become part of the wind consenting regime as a way of addressing impacts which are not countered by benefits. In the more traditional consenting model for other types of development, payments under Section 75 are generally made to mitigate effects on the surrounding area, and have to be related to the development concerned. Thermal consents provide much wider economic benefits in terms of jobs and economic activity in the supply chain, and are therefore unlike wind projects in this regard. There is no history, therefore, of community benefits payments per MW in relation to thermal consents. The proposed Grangemouth Renewable Energy plant will bring £26.45 million GVA growth to the local economy, 40 permanent operational jobs and between 300-500 construction jobs.

Forth Energy

Appendix C

Air Quality Supporting Information

Contents

Air Quality Supporting Information

C.1 Dispersion Modelling Methodology

ADMS Model Description

ADMS (Atmospheric Dispersion Modelling System) is a personal computer (PC) based model of dispersion in the atmosphere of passive, buoyant, or slightly dense, continuous or finite duration releases from single or multiple sources (including point, area or line sources). ADMS has been developed by Cambridge Environmental Research Centre (CERC) and is regarded as being a 'new generation' dispersion model, using an up-to-date parameter definition of the boundary layer structure based on the Monin-Obukhov length and the boundary layer height. ADMS is widely accepted as a current industry standard model for dispersion from point sources such as this facility.

The model incorporates a number of complex modules, allowing for the effects of plume rise, complex terrain, buildings and coastlines to be incorporated within the modelling study.

The ADMS model has a number of distinct features that can be summarised as follows:

- Concentration distributions are Gaussian in stable and neutral conditions, but the vertical distribution is non-Gaussian in convective conditions to take account of the skewed structure of the vertical component of turbulence;
- Actual plume spread depends on the local wind speed and turbulence which therefore depends on plume height. This is accounted for within ADMS and contrasts with Pasquill-Gifford methods that are used within some alternative modelling systems where plume spread is independent of height;
- Where required, a meteorological pre-processor calculates the required boundary layer parameters from a variety of input data (e.g. wind speed, day, time, cloud cover or surface heat flux). Meteorological data may be of statistically analysed or raw, hourly averaged (or hourly sequential) format;
- A number of complex modules allow for the effects of plume rise, complex terrain, structures, coastlines and the calculation of concentration fluctuations and radioactive decay to be incorporated within the dispersion modelling study; and
- The presence of buildings close to the release point can significantly affect the dispersion of material from a source. This influence can be taken into account by the use of an appropriate module in ADMS. The site buildings may influence the dispersion of emissions from the main stack. It is therefore important that building effects on dispersion are evaluated in detail. This was done using the ADMS buildings module.

Models of atmospheric dispersion processes are generally more reliable for long period means than short period means. Models are usually more reliable over intermediate distances (100m to 1000m) than very close to the source, or more distant from the source. This reflects the range of data that have been used to compile the models. Where emissions data are less reliable, or averaging periods are shorter, the results are likely to be less accurate.

To acknowledge this potential for variability in dispersion model results, a conservative approach has been adopted throughout the study. This means that modelled results are likely to be over-estimates of the levels that will arise in practice.

In summary, ADMS was considered to be the most suitable model for this application for the following reasons:

- Industry standard model for atmospheric dispersion modelling;
- Advanced understanding of boundary layer meteorology; and

- Ability to model the influence of buildings on plume dispersion.

Plume dispersion and subsequent ground level concentrations resulting from emissions from the proposed Renewable Energy Plant are governed principally by the following parameters:

- Stack height: the higher the flue gases are emitted the better the resulting dispersion;
- Temperature of exhaust gas: a higher exhaust gas temperature will result in the plume possessing a greater thermal buoyancy, giving a higher effective stack height and improved dispersion;
- Concentration of identified gaseous species in the exhaust gas: the concentration of gaseous species within the exhaust gas will have a direct effect on the subsequent ground level concentrations; and
- Volume flow rate of exhaust gas: the effect of an increase in volume flow rate will be two fold (all else being equal). It will result in an increase in mass emission rates and subsequent ground level concentrations and also increase the exit velocity which will result in improved plume dispersion.

Exhaust Gas Parameters

Table C.1 presents the inputs parameters specified within the ADMS dispersion model for the detailed dispersion modelling analysis.

Table C.1: Exhaust Gas Parameters as Used Within Dispersion Model

Parameter	Scenario 1	Scenario 2
Stack height	110 m	110 m
Stack location	E 293388 N 682461	E 29338 N, 682461
Flue diameter at exit	4.93 m	4.93 m
Exhaust gas temperature	75 °C	75 °C
Exit gas exit velocity	15.8 m/s	18 m/s
Volumetric flow rate (at stack discharge conditions)	301 m^3/s	343 m^3/s
Volumetric flow rate (at standard reference conditions)*	202 m^3/s	218 Nm^3/s
Exit gas moisture content (at stack discharge conditions)	16%	22.5%
Exit gas oxygen content (at stack discharge conditions)	5.1%	4.8%
NO_x emission concentration (standard reference conditions)*	200 mg/Nm^3	200 mg/Nm^3
NO_x emission rate	40.4 g/s	43.5 g/s
CO emission concentration (standard reference conditions)*	220 mg/Nm^3	220 mg/Nm^3
CO emission rate	44.5 g/s	47.9 g/s
SO_2 emission concentration (standard reference conditions)*	75 mg/Nm^3	75 mg/Nm^3
SO_2 emission rate	15.2 g/s	16.3 g/s
PM_{10} emission concentration (standard reference conditions)*	10 mg/Nm^3	10 mg/Nm^3
PM_{10} emission rate	2.0 g/s	2.2 g/s
$PM_{2.5}$ emission concentration (standard reference conditions)*	10 mg/Nm^3	10 mg/Nm^3
$PM_{2.5}$ emission rate	2.0 g/s	2.2 g/s
HCl emission concentration (standard reference conditions)*	15 mg/Nm^3	-
HCl emission rate	3.0 g/s	-
HF emission concentration (standard reference conditions)*	1.5 mg/Nm^3	-
HF emission rate	0.30 g/s	-
VOC emission concentration (standard reference conditions)*	15 mg/Nm^3	15 mg/Nm^3
VOC emission rate	3.0 g/s	3.3 g/s
Dioxins and furans emission concentration (standard reference conditions)*	0.1 ng/Nm^3	-
Dioxins and furans emission rate	20.2 ng/s	-
Cadmium and thallium total emission concentration (standard reference conditions)*	0.025 mg/Nm^3	-

Parameter	Scenario 1	Scenario 2
Cadmium and thallium total emission rate	0.005 g/s	-
Mercury emission concentration (standard reference conditions)*	0.025 mg/Nm^3	-
Mercury emission rate	0.005 g/s	-
Antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel, vanadium total emission concentration (standard reference conditions)*	0.25 mg/Nm^3	-
Antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel, vanadium total emission rate	0.05 g/s	-
NH_3 emission concentration (standard reference conditions)*	10 mg/Nm^3	10 mg/Nm^3
NH_3 emission rate	2.0 g/s	2.2 g/s
PAH emission concentration (standard reference conditions)*	0.002 mg/Nm^3	0.002 mg/Nm^3
PAH emission rate	0.0004 g/s	0.0004 g/s
Notes: * Standard reference conditions are: dry gas, 273 K, 101.3 kPa and 6% Oxygen v/v For the assessment of $PM_{2.5}$, emissions of particulate matter were assumed to be entirely in the form of $PM_{2.5}$. Making this assumption the most conservative approach		

The emissions data set out in Table C.1 represent two potential operating scenarios. Scenario 1 represents using 70% virgin wood and 30% waste wood with heat recovery from the flue gas. Scenario 2 represents using 100% virgin wood with heat recovery from the flue gas and has a higher volume of combustion gases than Scenario 1. Both scenarios were modelled for the air quality assessment to present a conservative approach as described below. Other potential emissions scenarios would result in lower emissions of pollutants and would lead to lower predicted ground level concentrations in the vicinity of the proposed plant due to lower volumetric flows or higher emission temperatures. These scenarios comprised a 'steam bleed' scenario with steam extraction and a 'No Heat' case without any heat extraction from the flue gas.

For Scenario 2, heavy metals, dioxins, hydrogen chloride and hydrogen fluoride were not modelled, as the emission limit values for these substances are specific to waste combustion, and Scenario 2 does not include any waste materials.

The results presented in Chapter 9 are based on a combination of the two emission scenarios set out above as follows:

Scenario 1: utilised to provide the results for emissions of metals, dioxins and furans, hydrogen fluoride and hydrogen chloride; and

Scenario 2: utilised to provide the results for emissions of oxides of nitrogen, sulphur dioxide, particulates, carbon monoxide, VOCs, ammonia and PAHs.

For the purposes of the modelling study it was assumed that all of the proposed process operates at 100% load continuously for the entire year.

Auxiliary boiler

Table C.2 presents the input parameters specified within the ADMS dispersion model for the detailed dispersion modelling of the auxiliary boiler. A suitable stack height was selected based on the size of plant and the results were analysed to determine the suitability of the stack height (see Chapter 9). The auxiliary boilers will be a modern efficient boiler design and utilise low-NOx burners and combustion control management to minimise emissions of pollutants. As stated in Chapter 9, the auxiliary boiler plant will run for a maximum of 12% of the year, and only when the main Renewable Energy Plant is offline.

Table C.2: Exhaust Gas Parameters for the auxiliary boilers (combined emissions)

Parameter	Value
Stack height	45 m
Stack location	E 293418 N 682489
Flue diameter at exit	1 m
Exhaust gas temperature	150 °C

Parameter	Value
Exit gas exit velocity	13.8 m/s
Volumetric flow rate (at stack discharge conditions)	10.8 m^3/s
Volumetric flow rate (at standard reference conditions)*	7.0 Nm^3/s
NO_x emission concentration (standard reference conditions)*	200 mg/Nm^3
NO_x emission rate	1.3 g/s
SO_2 emission concentration (standard reference conditions)*	350 mg/Nm^3
SO_2 emission rate	2.3 g/s
PM_{10} emission concentration (standard reference conditions)*	100 mg/Nm^3
PM_{10} emission rate	0.7 g/s
$PM_{2.5}$ emission concentration (standard reference conditions)*	100 mg/Nm^3
$PM_{2.5}$ emission rate	0.7 g/s
Notes: * Standard reference conditions are: dry gas, 273 K, 101.3 kPa and 6% Oxygen v/v For the assessment of $PM_{2.5}$, emissions of particulate matter were assumed to be entirely in the form of $PM_{2.5}$. Making this assumption the most conservative approach	

Meteorological Data

Meteorological datasets in ADMS format are available from a limited number of meteorological monitoring stations located around the UK.

Five years of hourly sequential data (from 2004 to 2008 inclusive) for Edinburgh Gogarbank meteorological monitoring station was obtained from the UK Met Office. The Edinburgh Gogarbank monitoring station is approximately 25 km east south-east of the proposed site. The surface roughness value at Edinburgh Gogarbank, the weather station used for the assessment, was 0.2m. This has been included in the model.

A wind rose[1] for each year is presented in Figure C1.1, an analysis of which has been considered to identify possible anomalies in the data or weather patterns within the datasets. The wind roses show general consistency of wind speed and direction frequency between the years, with wind blowing predominantly from the south-westerly to westerly direction. Notwithstanding the influence of structures close to the point of release, it is therefore expected that emissions to atmosphere from the proposed plant will generally disperse in an easterly to north-easterly direction from the point of release.

A set of meteorological data (2008) was used in a sensitivity test of the model using wind speed and direction measured at the Falkirk Council weather station, co-located with the Grangemouth Municipal Chambers air pollution monitoring station, with all other variables taken from Edinburgh Gogarbank weather station. A wind rose for this year of data is also provided in Figure C1.1. The average wind direction for Edinburgh Gogarbank and the Falkirk Council weather stations are 196° and 197°, respectively. The average wind speed at Edinburgh Gogarbank is approximately 1.2 m/s higher than that recorded at the Falkirk Council weather station.

Specified Study Area

The ADMS model calculates the predicted ground level concentrations at each grid intersection point (or node) of a user defined grid system of up to 101 x 101 points. Generally, the larger the study area, the less frequent (and therefore more dispersed) the number of grid calculation points and the lower the accuracy of the dispersion model. This must be offset however against the need to encompass an appropriately wide area within the dispersion modelling study to capture the dispersion of the stack emissions.

[1] A wind rose presents information on the direction that wind is blowing from over a year

The selection of an appropriate study grid must ensure that the highest predicted process contributions occur within the grid, and also that the grid covers a sufficiently large area, while having frequent calculation points, to ensure that the area most impacted by emissions from the plant is considered. The modelled grid was specified as a 5 km x 5km grid with calculation points every 50m (i.e. 101 points along each grid axis). This size of grid was selected to provide a good grid resolution and also encompass a sufficient area. The contour plots accompanying the air quality chapter indicate that the grid size is sufficient to determine the dispersion of substances from the proposed plant.

A sensitivity study was also carried out with a smaller grid but with a higher resolution. This grid was specified as a 2 km x 2 km grid with calculation points every 20 m (i.e. 101 points along each grid axis).

The potential short term impacts at sensitive human locations was determined by calculating the maximum concentration at any of the modelled grid locations across the full study area, except for locations within the proposed site boundary and locations representing the Forth Estuary. The potential long term impacts at sensitive human locations were determined by calculating the maximum concentration at any of the modelled grid locations representing the well defined residential locations to the south and west of the site. The modelled domain including the area covered by residential areas are shown on Figure 9.1 of the Environmental Statement (ES).

Sensitive Receptors

This study for sensitive human receptors was based on determining the maximum concentration at any modelled grid location at ground level as discussed above, including the nearby well defined residential areas set out in ES Figure 9.1.

The designated habitat sites included in this modelling study (sites within 15 km) are set out in Table C.3.

Table C.3: Designated sensitive habitat sites included in the modelling study

Designated Sensitive Habitat Site	Designation	Location (OS grid reference)		Approximate location relative to proposed stack location	
		E	N	Direction	Distance (m)
Firth of Forth (North shore)	SSSI & SPA	295566	684940	NNE	3,300
		295947	684909	NNE	3,540
		296328	684909	NNE	3,830
		296529	684771	NE	3,900
		296688	684760	NE	4,000
		297217	685014	NE	4,600
Firth of Forth (South shore close to site)	SSSI & SPA	293457*	682759*	NW to SE	310
Balquhidderock Wood	SSSI	281174	690834	NW	14,800
Blawhorn Moss	SSSI & SAC	289111	668665	SSW	14,400
Avon Gorge	SSSI	295460	679776	SE	3,390
Bo'mains Meadow	SSSI	298846	679353	ESE	6,280
Carriber Glen	SSSI	296677	675279	SSE	7,900
Carron Dams	SSSI	288106	682475	W	5,280
Carron Glen	SSSI	279852	683004	W	13,500
Darnrig Moss	SSSI	287259	675755	SW	9,090
Craigmad Wood	SSSI	296412	691681	NNE	9,700
Damhead Wood	SSSI	296465	696654	NNE	14,500
Gartmorn Dam	SSSI	292127	693797	N	11,400
Howierig Muir	SSSI	285989	678877	WSW	8,220
Linlithgow Loch	SSSI	299640	677501	SE	7,980
Linn Mill	SSSI	292709	692845	N	10,400
Lochcote Marsh	SSSI	297735	674273	SSE	9,270

Designated Sensitive Habitat Site	Designation	Location (OS grid reference)		Approximate location relative to proposed stack location	
		E	N	Direction	Distance (m)
Lockshaw Mosses	SSSI	298423	690411	NE	9,410
Petershill	SSSI	298635	670676	SSE	12,900
Philpstoun Muir	SSSI	306201	676760	SE	14,000
Steelend Moss	SSSI	304402	691998	NE	14,600
Wester Moss	SSSI	284137	690517	NW	12,300
Black Loch Moss	SSSI & SAC	286518	669459	SW	14,700
Slamannan Plateau	SSSI &SPA	283979	676760	SW	11,000

Note: *This grid reference corresponds to the closest point of this receptor to the site. The pollution concentrations at the Firth of Forth (south shore close to site) were modelled on a grid covering this habitat, and the maximum value from the grid was used in the assessment.

Surface Roughness

The variable turbulence caused by wind movements across structures and other surface features such as crops, forestry and bodies of water is described in terms of surface roughness which ranges from 0.001 m for areas over the sea, to 1.5 m for large built-up city centre areas. As the specified surface roughness influences the degree of turbulence within the dispersion model calculations, it also influences the dispersion of emissions from the Renewable Energy Plant and subsequently the resulting ground level process contributions.

The surface roughness selected for use within the dispersion model should best represent the entire grid used in the dispersion modelling. The grid used in the modelling of emissions from the Renewable Energy Plant, although incorporating Grangemouth, also contains very low roughness areas over the Forth Estuary.

On this basis, a variable surface roughness file was setup to represent the changing surface roughness across the study area. The study area encompassing the Forth Estuary was specified a surface roughness of 0.001 m (sea) and the area encompassing Grangemouth was specified a value of 0.8 m.

A sensitivity analysis was performed to estimate the impact on predicted process contributions of specifying a constant surface roughness across the whole study area using values of 0.001 m and 0.8 m.

Structural Influences

The airflow turbulence caused by significant structures in the vicinity of the stack is an important factor in the modelling of air dispersion.

In line with guidelines for the use of the ADMS model, only buildings within the equivalent of 5 stack heights and which are one third of the stack height or higher, will influence the dispersion of emissions and subsequent ground level concentrations. For the purpose of identifying structures, it is assumed that a 90 m high stack will be used.

A number of buildings satisfy the above criteria, the details of which are shown in Table C.4.

Table C.4: Structures Incorporated within Dispersion Modelling Study

Structure	Length (m)	Width / diameter (m)	Height (m)	Angle of Length to North (°)	Centre point co-ordinate	
					E	N
Boiler Hall, Turbine Hall and Admin*	60	85	65	99	293294	682459
Bag Filter	20	15	41.5	99	293344	682468
Open Stockpile/Alternative Fuel Storage Silos	n/a	125	35	n/a	293478	682423
Fuel Day Store and Screen (Combined)	83	40	20	99	293367	682417
Mixed Fuel Store	160	60	20	99	293243	682340
Cooling Towers (Combined)	55	80	23	99	293217	682475
Heat Accumulator Tank	14	n/a	22	n/a	293380	682487
Notes: * Denotes that this structure was defined as the 'main structure' within the dispersion model						

Terrain

The 'Terrain Module' in ADMS can be used within a dispersion modelling study, where the surrounding area is of complex topography, to ensure that the topographic nature of the surrounding area and its subsequent effects on air flow over the land are taken into account.

This is only likely to be significant if slopes exceed a gradient of 1:10 over significant distances compared with the distance over which dispersion is being modelled. A review of Ordnance Survey mapping of the local area indicated that this is not the case. Terrain effects were therefore not modelled in this study.

Treatment of Nitrogen Dioxide

Oxides of nitrogen emitted from combustion sources such as the proposed development are mainly in the form of nitric oxide (NO), with a relatively small proportion in the form of nitrogen dioxide (NO_2) (typically 5%)[2]. Nitric oxide is less potentially harmful to human health than nitrogen dioxide. Nitric oxide is oxidised in the atmosphere to form nitrogen dioxide. The reverse process converting nitrogen dioxide to nitric oxide also takes place in the atmosphere. In the immediate vicinity of a source of combustion gases, such as the proposed Renewable Energy Plant, conversion from nitric oxide to nitrogen dioxide does not proceed to near completion. This is because of three factors:

- Firstly, the reaction between nitric oxide and ozone (the main atmospheric oxidant) is not instantaneous, and dispersion away from the closest receptors will take place while this reaction is going on.
- Secondly, the amount of oxidants in the atmosphere available to convert nitric oxide to nitrogen dioxide is limited. Once the immediately available oxidants have been consumed, further reaction will be limited by the extent of atmospheric mixing.
- Thirdly, there is a competing atmospheric process by which nitrogen dioxide is converted back to nitric oxide in the presence of sunlight.

[2] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM. TG(03), January 2003

The Environment Agency, in the absence of Scottish guidance, has provided guidance for assessment of nitrogen dioxide[3]. Although the conversion to nitrogen dioxide is not likely to proceed to near completion, the Environment Agency's guidance indicates that, as a worst case, it can be assumed that 70% of oxides of nitrogen emitted from the proposed facility will be present as nitrogen dioxide for the assessment of long-term mean concentrations. For short-term mean concentrations, it can be assumed that 35% of the oxides of nitrogen emitted from the proposed facility will be present as nitrogen dioxide. While this approach is likely to over-estimate short-term mean levels of nitrogen dioxide, for the reasons set out above, it was adopted for the purposes of the assessment as a conservative approach.

Miscellaneous

The 15-minute mean sulphur dioxide concentrations were derived using the maximum concentration from the following two approaches as set out in LAQM.TG(09)[4]:

Method 1: Modelled 99.9th percentile of 15-minute means (ADMS can provide this);

Method 2: Modelled 99.9th percentile of 1-hour means multiplied by 1.34.

In order to complete the assessment for emissions of other substances, it was necessary to combine modelled concentrations of substances emitted from the plant with baseline concentrations of the substances present in the environment due to emissions from other sources. In the case of long-term mean concentrations, this was relatively straightforward, as long-term mean concentrations due to plant emissions could be added directly to long-term mean baseline concentrations.

It is not possible to add short-period peak baseline and process concentrations in the same way. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources.

This point is addressed in SEPA's H1 guidance[5] which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum short term concentration due to emissions from the source to twice the annual mean baseline concentration.

The exception is when assessing PM_{10} levels against the objective for 24 hour means the short term background was derived using the maximum concentration from the following two approaches as set out in LAQM.TG(09):

Method 1: 98th percentile 24-hour mean background PM_{10} (33.9 µg/m^3) plus twice the modelled annual mean process contribution PM_{10}; or

Method 2: Modelled 98th percentile 24-hour mean process contribution plus twice the annual mean background contribution (32.1 µg/m^3).

[3] Environment Agency: Air Quality Modelling and Assessment Unit, Conversion rates for NOx and NO2, accessed at www.environment-agency.gov.uk, January 2010

[4] Department for Environment, Food and Rural Affairs, Technical Guidance LAQM.TG(09), Part IV of the Environment Act 1995 "Local Air Quality Management: Technical Guidance," 2009

[5] Scottish Environment Protection Agency, Integrated Pollution, Prevention and Control (IPPC), Environmental Assessment and Appraisal of BAT, Horizontal Technical Guidance Note H1, July 2003

Modelling Uncertainty and Conservative Assumptions

Uncertainty

There are always uncertainties in dispersion models in common with any environmental modelling study, because a dispersion model is an approximation to the complex processes which take place in the atmosphere. Some of the key factors which lead to uncertainty in atmospheric dispersion modelling are as follows:

- The quality of the model output depends on the accuracy of the input data that goes into the model. Where model input data are a less reliable representation of the true situation, the results are likely to be less accurate.
- The meteorological datasets used in the model are not likely to be completely representative of the meteorological conditions at the site. However, the most suitable available meteorological data was chosen for the assessment.
- Models are generally designed on the basis of data obtained for large scale point sources, and may be less well validated for modelling emissions from smaller scale sources.
- The modelling of atmospheric dispersion processes are more reliable for long period means than short period means. ADMS is usually more reliable over intermediate distances (100 m to 1000 m) than very close to the source, or more distant from the source. This reflects the range of data that have been used to compile the models.
- The dispersion of pollutants around buildings is a complex scenario to replicate. Dispersion models can take account of the effects of buildings on dispersion; however there will be greater uncertainty in the model results when buildings are included in the model.
- Modelling does not specifically take into account individual small-scale features such as vegetation, local terrain variations and off-site buildings. The roughness length (z_o) selected is suitable to take account of the typical size of these local features.

To take account of these uncertainties and to ensure the predictions are more likely to be over-estimates than under-estimates, the conservative assumptions described below have been used for this assessment.

Conservative Assumptions

The conservative assumptions adopted in this study are summarised below:

- It was assumed that the proposed Renewable Energy plant will operate continuously at maximum load. In practice, the plant will have periods of shut-down and maintenance;
- The study is based on emissions being continuously at the emission limits specified;
- The highest predicted concentration at any off-site location on land in Grangemouth was used in the assessment of short term environmental effects. The highest predicted concentration at any residential location was used in the assessment of long term environmental effects. Concentrations at other locations are likely to be less than the maximum values presented;
- The highest predicted concentrations obtained using any of the five different years of met data have been used in this assessment. During a typical year the ground level concentrations are likely to be lower;
- It was assumed that 70% of oxides of nitrogen emitted from the plant will be converted to nitrogen dioxide at ground level in the vicinity of the plant for determination of the annual mean. It was assumed that 35% of oxides of nitrogen

will be converted to nitrogen dioxide for determination of the short term concentrations. The actual conversion to nitrogen dioxide is likely to be less than this;

- It was assumed that 100% of the particulate matter emitted from the plant is in the PM_{10} size fraction. The actual proportion will be less than 100%;
- It was assumed that 100% of the particulate matter emitted from the plant is in the $PM_{2.5}$ size fraction. The actual proportion will be less than 100%. Other studies submitted to SEPA have used a value of 33%;

Plume Visibility Module

Industrial scale combustion activities can at times result in the release of a visible plume of water vapour from a stack. Under usual meteorological conditions in the UK, such plumes are rarely visible, only becoming visible when the water content of the air exceeds its holding capacity at that particular temperature.

Existing thermal power stations in the UK (firing on gas, coal or oil) inherently produce few visible plumes (although the fitting of FGD can increase the potential plume visibility). A biomass fired plant such as the Renewable Energy Plant is more likely to produce a visible water vapour plume due to differences in fuel composition and inherent moisture. The 'Plume Visibility' module in ADMS 4 takes as its inputs:

- Surface humidity (provided by the Met Office for the Edinburgh Gogarbank meteorological station in percentage terms as 'relative humidity');
- Surface temperature (the ambient air temperature); and
- The initial mixing ratio in the plume of moisture per kg of dry release (expressed in kg/kg). In this case a figure of 0.14 kg/kg has been used.

The model calculates the frequency and duration of plume visibility based on the above factors and allows analysis of visibility data to determine the length of plumes and the time of day of their visibility.

Optimum Stack Height Determination

A detailed study has been undertaken to determine an appropriate stack height for the proposed Renewable Energy Plant in order to achieve an acceptable balance between protecting local air quality whilst minimising the visual impact of the stack. .

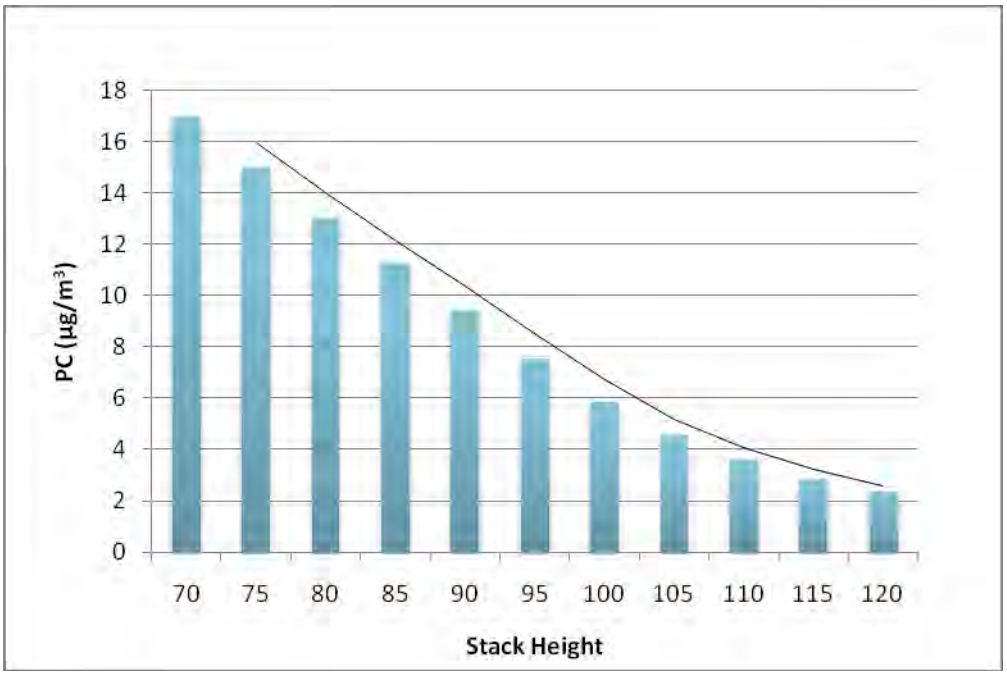
A provisional stack height was initially calculated using the methodology outlined in the HMIP Guidance Note 'D1' on assessing stack heights[6], using the Renewable Energy Plant emission parameters and site layout. It is noted that the D1 Guidance Note is based on relatively simply formulae for calculating stack heights and is considered to be a less accurate means to determine stack heights compared to atmospheric dispersion modelling. The D1 Guidance Note stack height calculations do, however, provide a useful guide to establish the parameters for more sophisticated atmospheric dispersion modelling undertaken to establish the optimum stack height.

The D1 Guidance Note calculations derive a stack height of 82 m above ground level. Atmospheric dispersion modelling was subsequently undertaken for a range of stack heights in order to identify the most suitable stack height beyond which the benefit, in terms of air quality impacts, in increasing the height further, are offset against the visual and cost impact of a taller stack.

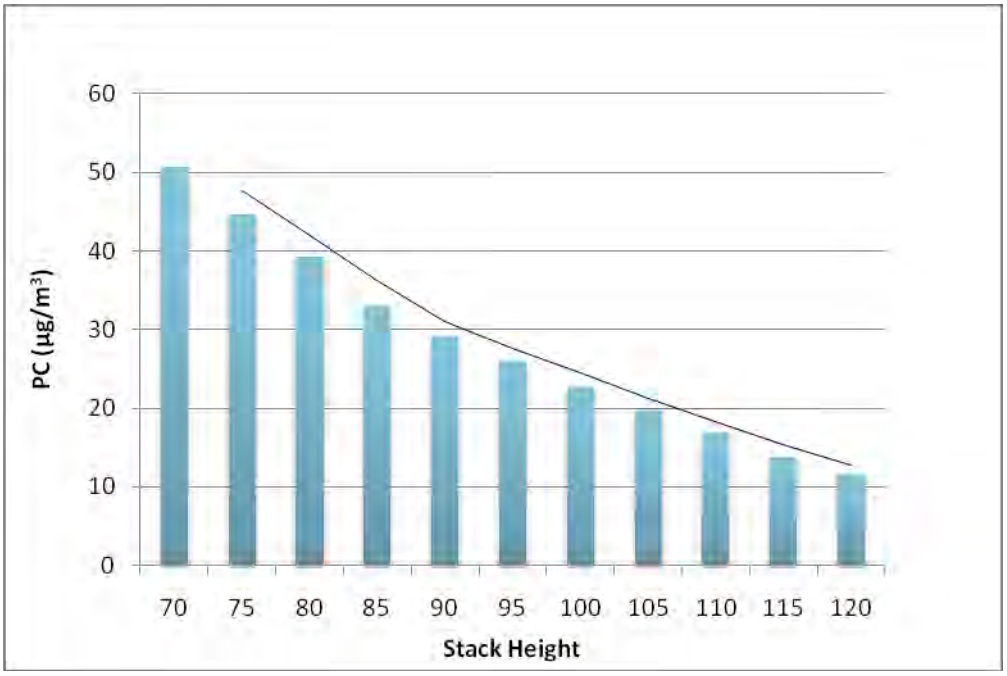
Graphs C.1 to C.4 show the results of the dispersion modelling study for heights between 70 m and 120 m for annual average NO_2, hourly mean NO_2 and SO_2 process contributions and daily mean PM_{10} process contributions. The concentrations presented are the maximum concentration at any of the modelled grid locations across the full study area, except for locations within the proposed site boundary and locations representing the Forth Estuary.

[6] Technical Guidance Note (Dispersion) D1: Guidelines on Discharge Stack Heights for Polluting Emissions HMIP, 1993

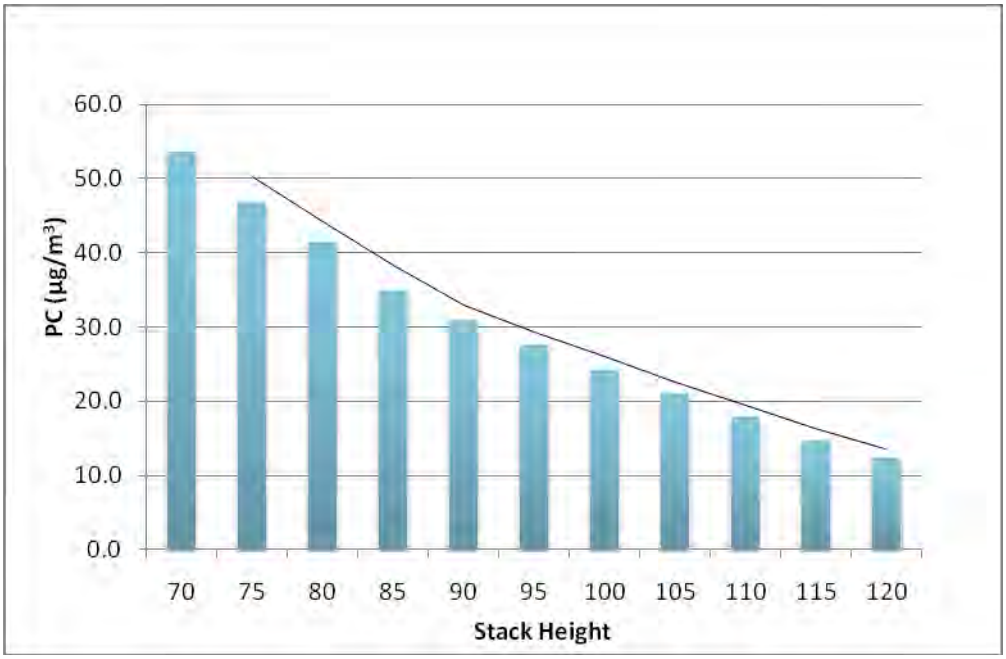
Graph C.1: Predicted annual average NO_2 process contributions at various stack heights



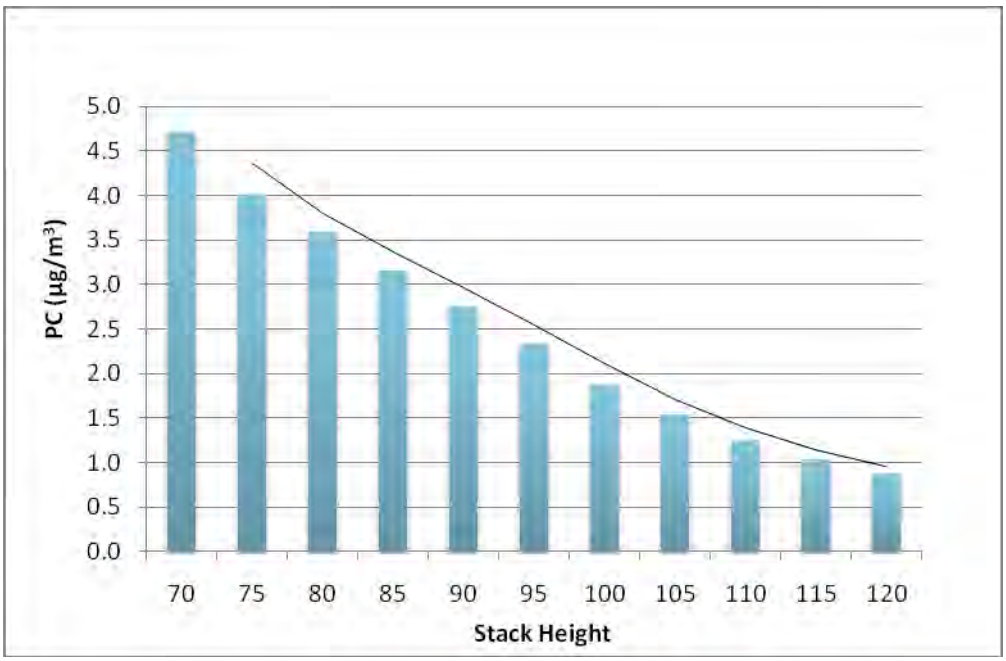
Graph C.2: Predicted 99.8th percentile of hourly mean NO_2 process contributions at various stack heights



Graph C.3: Predicted 99.7th percentile of hourly mean SO_2 process contributions at various stack heights



Graph C.4: Predicted 98.1st percentile daily mean PM_{10} process contributions at various stack heights



A comparison of the data in Graphs C.1 to C.4 with the air quality objectives indicates that the process contributions are predicted to be well within the objective values at all of the modelled stack heights.

The graphs all show the same typical pattern that the annual average process contributions continuously reduce as the stack height is increased from up to 110 m – 115 m, and to a lesser extent as the height increases above this range.

On the above basis, and in view of the results set out in the above graphs, a stack height of 110 m was selected as the most appropriate for the proposed facility. At 110 m, the contributions of sulphur dioxide concentrations within the Grangemouth Air Quality Management Area are considered insignificant (i.e. the short term process contributions for the 15-minute, 1-hour and 24-hour mean concentrations are less than 10% of the relevant air quality objectives)[5]. It is

considered that a stack height of 110 m would represent an acceptable balance between reducing the impact on air quality and visual impacts.

Nitrogen and Acid Deposition at Designated Sites

Nitrogen and acid deposition have been predicted using the methodologies presented in the EA Technical Guidance note: AQTAG 06 "Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air[7] (in the absence of Scottish Guidance).

When assessing the deposition of nitrogen, it is important to consider the different deposition properties of nitric oxide and nitrogen dioxide. It is generally accepted that there is no wet or dry deposition arising from nitric oxide in the atmosphere, and that there is no wet deposition due to nitrogen dioxide. Thus it is necessary to distinguish between nitric oxide and nitrogen dioxide in a deposition assessment and the same ratio that was used in the assessment of human health impacts was utilised for the assessment at designated sites (i.e. 70% of the oxides of nitrogen are in the form of nitrogen dioxide).

Sulphur deposition occurs in both wet and dry conditions, as sulphur dioxide is relatively water-soluble. However the wet deposition of sulphur occurs at larger distances than those considered here and has therefore been discounted with regards to localised impacts. This also applies to ammonia.

Information on background levels of nitrogen and acid deposition and also information on critical load ranges at the protected sites have been obtained from the Air Pollution Information System (APIS) database. The minimum values of the critical load ranges stated on the APIS database were used, as a conservative approach.

If the annual average ground level concentration of a pollutant is C (µg/m^3) and the dry deposition velocity for that pollutant is Vd (m/s) then the annual dry deposition rate D (kg/ha/yr) is calculated from the following formula:

- $D = V_d \times C \times R \times 315.36$

Where

- R is 14/46 for NO_2; 32/64 for SO_2; and 14/17 for HCl, and converts from nitrogen dioxide to nitrogen, sulphur dioxide to sulphur and NH_3 to nitrogen; and
- '315.36' converts to kg/ha/yr[8]

Dry deposition velocities vary depending on the type of land mass and weather conditions such as humidity. The following values have been used for Vd, as presented within the Technical Guidance note.

- NO_2 – 0.0015 m/s
- SO_2 – 0.012 m/s
- NH_3 – 0.02m/s

In order to calculate acid deposition in terms of keq / ha / year from deposition data (calculated using the equation above) in terms of kg / ha / year the following conversion factors are used:

- 1 kg N / ha / yr is equal to 1/14 keq N / ha / yr;
- 1 kg S / ha / yr is equal to 1/16 keq S / ha / yr; and

[7] Environment Agency, AQTAG 06 "Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, 20/04/10, version 10.

[8] 315.36 = 10,000 (m^2 in hectare) x 8,760 (hours in year) x 3,600 (seconds in an hour) divided by 1,000,000,000 (micrograms in kilogram)

- 1 kg H / ha / yr is equal to 1 keq H / ha / yr.

C.2 Ambient Air Quality Data

Table C.5 summaries all baseline air quality data considered for this assessment

Table C.5: Background air quality data considered for this assessment

Pollutant		Year	Concentration ($\mu g/m^3$)	Source
Oxides of nitrogen		2009	various	Values from background mapping of grid squares covering habitat sites - 2009. For values, see Table C.8.
Nitrogen dioxide		2009	27.8	Maximum value from background mapping of grid squares immediately surrounding the proposed site, centred on 293500, 682500
		2009	14.9	Background map - grid square 293500, 682500
		2009	18.0	Annual mean diffusion tube data - Tinto Drive
		2009	20.6	Annual mean diffusion tube data - Lennox Terrace
		2009	19.1	Annual mean diffusion tube data - Albert Avenue
		2009	27.4	Annual mean diffusion tube data - Inchyra Road
		2009	19.1	Annual mean monitoring station data - Grangemouth Moray
		2009	22.8	Annual mean monitoring station data - Grangemouth Municipal Chambers
		2009	17.7	Annual mean monitoring station data – Grangemouth Inchyra Park
PM_{10}		2009	12.6	Maximum value from background mapping of grid squares immediately surrounding the proposed site, centred on 293500, 682500
		2009	10.7	Background map - grid square 293500, 682500
		2009	15.6	Annual mean monitoring station data - Grangemouth Moray
		2009	16.1	Annual mean monitoring station data - Grangemouth Municipal Chambers
		2009	33.9	98.08^{th} percentile of daily mean monitoring station data - Grangemouth Municipal Chambers (used for Method 1)
		2009	12.9	Annual mean monitoring station data – Grangemouth Inchyra Park
Sulphur dioxide		2001	10.6	Maximum value from background mapping of grid squares immediately surrounding the proposed site, centred on 293500, 682500
		2009	11.2	Annual mean monitoring station data - Grangemouth Moray
		2009	7.0	Annual mean monitoring station data - Grangemouth Municipal Chambers
		2009	7.6	Annual mean monitoring station data – Grangemouth Inchyra Park
Carbon monoxide		2001	243	Maximum value from background mapping of grid squares immediately surrounding the proposed site, centred on 293500, 682500
$PM_{2.5}$		2009	8.8	Maximum value from background mapping of grid squares immediately surrounding the proposed site, centred on 293500, 682500
		2009	6.6	Background map - grid square 293500, 682500
		2009	8.6	Annual mean monitoring station data – Grangemouth Inchyra Park
Dioxins/Furans (fg/m^3)		2008	11	Average measured levels during national surveys 2008(value given is Toxic Equivalent (WHO, 2006), TEQ)
PAH (Benzo(a)pyrene)		2009	0.00046	Average measured levels during national surveys
Ammonia		2008	1.19	Level measured at Edinburgh St Leonards - 2008
Trace Metals	Arsenic	2009	0.00051	Average level recorded across three national survey sites
	Cadmium	2009	0.00017	
	Chromium	2009	0.00236	

Pollutant		Year	Concentration (µg/m³)	Source
	Copper	2009	0.00588	
	Manganese	2009	0.01180	
	Nickel	2009	0.00090	
	Lead	2009	0.00836	
	Vanadium	2009	0.00189	
	Mercury	2009	0.00204	
	Antimony	2008	0.00170	Average value from measurements taken in Staffordshire for a planning application
	Cobalt	2008	0.00070	
	Thallium	2008	0.00080	
Hydrogen Chloride		2008	0.20	Level measured at Bush 1 (LHS) (AGANET network)

C.3 Cumulative Impact Model Input Data

Table C.6: Emission Parameters Used for Cumulative Impacts

Parameter	Rosyth	Leith 1	Leith 2
Stack height	100 m	105 m	105 m
Stack location	E 311241 N 681871	E 327643 N 677083	E 327678 N 677061
Flue diameter at exit	3.83 m	3.83 m	3.83 m
Exhaust gas temperature	75 °C	75 °C	75 °C
Exit gas exit velocity	18 m/s	18 m/s	18 m/s
Volumetric flow rate (at stack discharge conditions)	207 m^3/s	207 m^3/s	207 m^3/s
Volumetric flow rate (at standard reference conditions)*	132 Nm^3/s	132 Nm^3/s	132 Nm^3/s
Exit gas moisture content (at stack discharge conditions)	24.0%	24.0%	24.0%
Exit gas oxygen content (at stack discharge conditions)	5.1%	5.1%	5.1%
NO_x emission concentration (standard reference conditions)*	200 mg/Nm^3	200 mg/Nm^3	200 mg/Nm^3
NO_x emission rate	26.3 g/s	26.3 g/s	26.3 g/s
SO_2 emission concentration (standard reference conditions)*	75 mg/Nm^3	75 mg/Nm^3	75 mg/Nm^3
SO_2 emission rate	9.9 g/s	9.9 g/s	9.9 g/s
NH_3 emission concentration (standard reference conditions)*	10 mg/Nm^3	10 mg/Nm^3	10 mg/Nm^3
NH_3 emission rate	1.3 g/s	1.3 g/s	1.3 g/s
Notes: * Standard reference conditions are: dry gas, 273 K, 101.3 kPa and 6% Oxygen v/v For the assessment of $PM_{2.5}$, emissions of particulate matter were assumed to be entirely in the form of $PM_{2.5}$. Making this assumption the most conservative approach			

C.3.1

C.4 Traffic Data

Table C.7 summarises the traffic data used in the assessment and is based on the data provided in Chapter 18 (Traffic and Transport Assessment).

Table C.7: Traffic Data Used in Assessment

Road Link	Annual Average Daily Traffic (AADT) (2014)	Increase in Traffic Movements Per Day	Increase Compared to AADT	Increase in HGV Movements
North Shore Road	4180	600	14.4%	86
A904 Earls Road	10033	419	4.2%	86
A904 Station Road / Bo'Ness Road	12017	116	1.0%	0
Forth & Clyde Way / South Bridge Street	7662	65	0.8%	0
A905 Glensburgh Road	13998	78	0.6%	22
A905 Beancross Road	13833	136	1.0%	0
B9132 Newlands Road	12954	70	0.5%	0
A904 Falkirk Road	25093	172	0.7%	43
A9 Lauriston Bypass	22527	172	0.8%	43

C.5 Dispersion Modelling Results at Designated Habitat Sites

Table C.8: Predicted annual mean oxides of nitrogen concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	30	23.9	3.94	27.8	13.1%	92.8%
Balquhidderock Wood (SSSI)		18.0	0.02	18.0	0.06%	60.0%
Blawhorn Moss (SSSI, SAC)		9.8	0.04	9.9	0.14%	33.0%
Avon Gorge (SSSI)		19.0	0.10	19.1	0.35%	63.6%
Bo'mains Meadow (SSSI)		15.3	0.09	15.4	0.30%	51.4%
Carriber Glen (SSSI)		10.9	0.06	11.0	0.20%	36.6%
Carron Dams (SSSI)		24.5	0.11	24.7	0.37%	82.2%
Carron Glen (SSSI)		11.8	0.05	11.8	0.17%	39.3%
Darnrig Moss (SSSI)		10.1	0.11	10.2	0.37%	34.0%
Craigmad Wood (SSSI)		9.7	0.10	9.8	0.35%	32.8%
Damhead Wood (SSSI)		9.0	0.06	9.1	0.19%	30.2%
Gartmorn Dam (SSSI)		10.7	0.02	10.7	0.08%	35.7%
Howierig Muir (SSSI)		11.8	0.23	12.0	0.77%	40.0%
Linlithgow Loch (SSSI)		20.3	0.06	20.3	0.22%	67.7%
Linn Mill (SSSI)		11.2	0.03	11.3	0.11%	37.5%
Lochcote Marsh (SSSI)		10.5	0.05	10.5	0.17%	35.1%
Lockshaw Mosses (SSSI)		10.7	0.21	10.9	0.7%	36.4%
Petershill (SSSI)		11.8	0.04	11.8	0.13%	39.4%
Philpstoun Muir (SSSI)		13.5	0.04	13.5	0.14%	45.1%
Steelend Moss (SSSI)		10.9	0.28	11.2	0.93%	37.4%
Wester Moss (SSSI)		13.2	0.02	13.3	0.07%	44.2%
Black Loch Moss (SSSI, SAC)		9.4	0.05	9.5	0.16%	31.6%
Slamannan Plateau (SSSI, SPA)		10.8	0.16	10.9	0.52%	36.5%
Firth Of Forth (north shore) (SSSI, SPA)		16.2	1.15	17.4	3.8%	57.9%

Table C.9: Predicted annual mean sulphur dioxide concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	20	8.0	1.48	9.4	7.4%	47.1%
Balquhidderock Wood (SSSI)		1.9	0.01	1.9	0.03%	9.6%
Blawhorn Moss (SSSI, SAC)		1.8	0.02	1.8	0.1%	8.9%
Avon Gorge (SSSI)		2.6	0.04	2.6	0.2%	13.2%
Bo'mains Meadow (SSSI)		2.4	0.03	2.5	0.2%	12.4%
Carriber Glen (SSSI)		1.8	0.02	1.9	0.1%	9.3%
Carron Dams (SSSI)		2.7	0.04	2.8	0.2%	13.9%
Carron Glen (SSSI)		1.2	0.02	1.2	0.1%	6.0%
Darnrig Moss (SSSI)		2.1	0.04	2.2	0.2%	10.9%
Craigmad Wood (SSSI)		1.8	0.04	1.8	0.2%	9.1%
Damhead Wood (SSSI)		1.3	0.02	1.4	0.1%	6.8%
Gartmorn Dam (SSSI)		1.6	0.01	1.6	0.05%	8.2%
Howierig Muir (SSSI)		1.4	0.09	1.5	0.4%	7.5%
Linlithgow Loch (SSSI)		2.6	0.02	2.6	0.1%	13.1%
Linn Mill (SSSI)		1.7	0.01	1.7	0.1%	8.6%
Lochcote Marsh (SSSI)		1.6	0.02	1.6	0.1%	8.2%
Lockshaw Mosses (SSSI)		3.2	0.08	3.3	0.4%	16.6%
Petershill (SSSI)		1.7	0.01	1.7	0.1%	8.4%
Philpstoun Muir (SSSI)		1.7	0.02	1.7	0.1%	8.7%
Steelend Moss (SSSI)		4.2	0.10	4.3	0.5%	21.6%
Wester Moss (SSSI)		1.4	0.01	1.4	0.04%	7.0%
Black Loch Moss (SSSI, SAC)		1.5	0.02	1.5	0.1%	7.4%
Slamannan Plateau (SSSI, SPA)		1.5	0.06	1.6	0.3%	8.0%
Firth Of Forth (north shore) (SSSI, SPA)		10.3	0.43	10.7	2.2%	53.5%

Table C.10: Predicted annual mean ammonia concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	3	1.19	0.20	1.39	6.6%	46%
Balquhidderock Wood (SSSI)	3		0.001	1.19	0.03%	40%
Blawhorn Moss (SSSI, SAC)	1		0.002	1.19	0.2%	119%
Avon Gorge (SSSI)	3		0.005	1.20	0.2%	40%
Bo'mains Meadow (SSSI)	3		0.005	1.19	0.2%	40%
Carriber Glen (SSSI)	3		0.003	1.19	0.1%	40%
Carron Dams (SSSI)	3		0.006	1.20	0.2%	40%
Carron Glen (SSSI)	3		0.002	1.19	0.1%	40%
Darnrig Moss (SSSI)	1		0.006	1.20	0.6%	120%
Craigmad Wood (SSSI)	1		0.005	1.20	0.5%	120%
Damhead Wood (SSSI)	3		0.003	1.19	0.1%	40%
Gartmorn Dam (SSSI)	3		0.001	1.19	0.04%	40%
Howierig Muir (SSSI)	1		0.011	1.20	1.1%	120%
Linlithgow Loch (SSSI)	3		0.003	1.19	0.1%	40%
Linn Mill (SSSI)	3		0.002	1.19	0.1%	40%
Lochcote Marsh (SSSI)	1		0.003	1.19	0.3%	119%
Lockshaw Mosses (SSSI)	1		0.011	1.20	1.1%	120%
Petershill (SSSI)	3		0.002	1.19	0.1%	40%
Philpstoun Muir (SSSI)	3		0.002	1.19	0.1%	40%
Steelend Moss (SSSI)	1		0.014	1.20	1.4%	120%
Wester Moss (SSSI)	1		0.001	1.19	0.1%	119%
Black Loch Moss (SSSI, SAC)	1		0.002	1.19	0.2%	119%
Slamannan Plateau (SSSI, SPA)	3		0.008	1.20	0.3%	40%
Firth Of Forth (north shore) (SSSI, SPA)	3		0.058	1.25	1.9%	42%

Table C.11: Predicted maximum hourly mean ammonia concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	3300	2.38	2.41	4.79	0.07%	0.15%
Balquhidderock Wood (SSSI)			0.26	2.64	0.01%	0.08%
Blawhorn Moss (SSSI, SAC)			0.32	2.70	0.01%	0.08%
Avon Gorge (SSSI)			1.06	3.44	0.03%	0.10%
Bo'mains Meadow (SSSI)			0.53	2.91	0.02%	0.09%
Carriber Glen (SSSI)			0.57	2.95	0.02%	0.09%
Carron Dams (SSSI)			0.65	3.03	0.02%	0.09%
Carron Glen (SSSI)			0.34	2.72	0.01%	0.08%
Darnrig Moss (SSSI)			0.45	2.83	0.01%	0.09%
Craigmad Wood (SSSI)			0.46	2.84	0.01%	0.09%
Damhead Wood (SSSI)			0.31	2.69	0.01%	0.08%
Gartmorn Dam (SSSI)			0.40	2.78	0.01%	0.08%
Howierig Muir (SSSI)			0.45	2.83	0.01%	0.09%
Linlithgow Loch (SSSI)			0.44	2.82	0.01%	0.09%
Linn Mill (SSSI)			0.46	2.84	0.01%	0.09%
Lochcote Marsh (SSSI)			0.51	2.89	0.02%	0.09%
Lockshaw Mosses (SSSI)			0.46	2.84	0.01%	0.09%
Petershill (SSSI)			0.40	2.78	0.01%	0.08%
Philpstoun Muir (SSSI)			0.34	2.72	0.01%	0.08%
Steelend Moss (SSSI)			0.29	2.67	0.01%	0.08%
Wester Moss (SSSI)			0.33	2.71	0.01%	0.08%
Black Loch Moss (SSSI, SAC)			0.34	2.72	0.01%	0.08%
Slamannan Plateau (SSSI, SPA)			0.37	2.75	0.01%	0.08%
Firth Of Forth (north shore) (SSSI, SPA)			0.73	3.11	0.02%	0.09%

C.6 Dispersion Modelling Results at Designated Habitat Sites – Cumulative Effects

Table C.12: Predicted annual mean oxides of nitrogen concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	30	23.9	3.99	27.9	13.3%	92.9%
Balquhidderock Wood (SSSI)		18.0	0.05	18.0	0.15%	60.1%
Blawhorn Moss (SSSI, SAC)		9.8	0.14	10.0	0.47%	33.3%
Avon Gorge (SSSI)		19.0	0.18	19.1	0.59%	63.8%
Bo'mains Meadow (SSSI)		15.3	0.18	15.5	0.60%	51.6%
Carriber Glen (SSSI)		10.9	0.19	11.1	0.62%	37.0%
Carron Dams (SSSI)		24.5	0.16	24.7	0.54%	82.4%
Carron Glen (SSSI)		11.8	0.09	11.8	0.30%	39.5%
Darnrig Moss (SSSI)		10.1	0.18	10.3	0.60%	34.2%
Craigmad Wood (SSSI)		9.7	0.12	9.9	0.41%	32.8%
Damhead Wood (SSSI)		9.0	0.08	9.1	0.25%	30.3%
Gartmorn Dam (SSSI)		10.7	0.04	10.7	0.14%	35.7%
Howierig Muir (SSSI)		11.8	0.30	12.1	0.99%	40.2%
Linlithgow Loch (SSSI)		20.3	0.20	20.5	0.67%	68.2%
Linn Mill (SSSI)		11.2	0.05	11.3	0.17%	37.6%
Lochcote Marsh (SSSI)		10.5	0.18	10.7	0.61%	35.6%
Lockshaw Mosses (SSSI)		10.7	0.24	10.9	0.8%	36.5%
Petershill (SSSI)		11.8	0.15	11.9	0.50%	39.7%
Philpstoun Muir (SSSI)		13.5	0.19	13.7	0.64%	45.6%
Steelend Moss (SSSI)		10.9	0.30	11.2	0.99%	37.4%
Wester Moss (SSSI)		13.2	0.05	13.3	0.16%	44.3%
Black Loch Moss (SSSI, SAC)		9.4	0.14	9.6	0.46%	31.9%
Slamannan Plateau (SSSI, SPA)		10.8	0.22	11.0	0.75%	36.7%
Firth Of Forth (north shore) (SSSI, SPA)		16.2	1.19	17.4	4.0%	58.1%

Table C.13: Predicted annual mean sulphur dioxide concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	20	8.0	1.50	9.4	7.5%	47.2%
Balquhidderock Wood (SSSI)		1.9	0.02	1.9	0.1%	9.6%
Blawhorn Moss (SSSI, SAC)		1.8	0.05	1.8	0.3%	9.0%
Avon Gorge (SSSI)		2.6	0.07	2.7	0.3%	13.3%
Bo'mains Meadow (SSSI)		2.4	0.07	2.5	0.3%	12.6%
Carriber Glen (SSSI)		1.8	0.07	1.9	0.3%	9.5%
Carron Dams (SSSI)		2.7	0.06	2.8	0.3%	14.0%
Carron Glen (SSSI)		1.2	0.03	1.2	0.2%	6.1%
Darnrig Moss (SSSI)		2.1	0.07	2.2	0.3%	11.1%
Craigmad Wood (SSSI)		1.8	0.05	1.8	0.2%	9.2%
Damhead Wood (SSSI)		1.3	0.03	1.4	0.1%	6.8%
Gartmorn Dam (SSSI)		1.6	0.02	1.6	0.1%	8.2%
Howierig Muir (SSSI)		1.4	0.11	1.5	0.6%	7.6%
Linlithgow Loch (SSSI)		2.6	0.08	2.7	0.4%	13.3%
Linn Mill (SSSI)		1.7	0.02	1.7	0.1%	8.7%
Lochcote Marsh (SSSI)		1.6	0.07	1.7	0.3%	8.4%
Lockshaw Mosses (SSSI)		3.2	0.09	3.3	0.4%	16.6%
Petershill (SSSI)		1.7	0.06	1.7	0.3%	8.6%
Philpstoun Muir (SSSI)		1.7	0.07	1.8	0.4%	9.0%
Steelend Moss (SSSI)		4.2	0.11	4.3	0.6%	21.6%
Wester Moss (SSSI)		1.4	0.02	1.4	0.1%	7.1%
Black Loch Moss (SSSI, SAC)		1.5	0.05	1.5	0.3%	7.5%
Slamannan Plateau (SSSI, SPA)		1.5	0.08	1.6	0.4%	8.1%
Firth Of Forth (north shore) (SSSI, SPA)		10.3	0.45	10.7	2.2%	53.6%

Table C.14: Predicted annual mean ammonia concentration

Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	3	1.19	0.20	1.39	6.7%	46%
Balquhidderock Wood (SSSI)	3		0.002	1.19	0.1%	40%
Blawhorn Moss (SSSI, SAC)	1		0.01	1.20	0.7%	120%
Avon Gorge (SSSI)	3		0.01	1.20	0.3%	40%
Bo'mains Meadow (SSSI)	3		0.01	1.20	0.3%	40%
Carriber Glen (SSSI)	3		0.01	1.20	0.3%	40%
Carron Dams (SSSI)	3		0.01	1.20	0.3%	40%
Carron Glen (SSSI)	3		0.005	1.19	0.2%	40%
Darnrig Moss (SSSI)	1		0.01	1.20	0.9%	120%
Craigmad Wood (SSSI)	1		0.01	1.20	0.6%	120%
Damhead Wood (SSSI)	3		0.004	1.19	0.1%	40%
Gartmorn Dam (SSSI)	3		0.002	1.19	0.1%	40%
Howierig Muir (SSSI)	1		0.01	1.20	1.5%	120%
Linlithgow Loch (SSSI)	3		0.01	1.20	0.3%	40%
Linn Mill (SSSI)	3		0.003	1.19	0.1%	40%
Lochcote Marsh (SSSI)	1		0.01	1.20	0.9%	120%
Lockshaw Mosses (SSSI)	1		0.01	1.20	1.2%	120%
Petershill (SSSI)	3		0.01	1.20	0.2%	40%
Philpstoun Muir (SSSI)	3		0.01	1.20	0.3%	40%
Steelend Moss (SSSI)	1		0.01	1.20	1.5%	120%
Wester Moss (SSSI)	1		0.002	1.19	0.2%	119%
Black Loch Moss (SSSI, SAC)	1		0.01	1.20	0.7%	120%
Slamannan Plateau (SSSI, SPA)	3		0.01	1.20	0.4%	40%
Firth Of Forth (north shore) (SSSI, SPA)	3		0.06	1.25	2.0%	42%

Table C.15: Predicted maximum hourly mean ammonia concentration

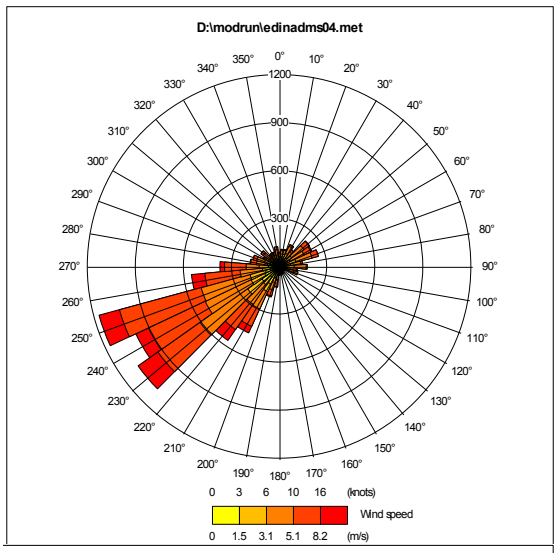
Designated Habitat Site	EQS (µg/m^3)	Adopted ambient air quality level (µg/m^3)	PC (µg/m^3)	PEC (µg/m^3)	PC / EQS (%)	PEC / EQS (%)
Firth Of Forth (south shore close to site) (SSSI, SPA)	3300	2.38	2.80	5.18	0.08%	0.16%
Balquhidderock Wood (SSSI)			0.49	2.87	0.01%	0.09%
Blawhorn Moss (SSSI, SAC)			0.65	3.03	0.02%	0.09%
Avon Gorge (SSSI)			1.47	3.85	0.04%	0.12%
Bo'mains Meadow (SSSI)			1.04	3.42	0.03%	0.10%
Carriber Glen (SSSI)			1.01	3.39	0.03%	0.10%
Carron Dams (SSSI)			0.95	3.33	0.03%	0.10%
Carron Glen (SSSI)			0.59	2.97	0.02%	0.09%
Darnrig Moss (SSSI)			0.77	3.15	0.02%	0.10%
Craigmad Wood (SSSI)			0.85	3.23	0.03%	0.10%
Damhead Wood (SSSI)			0.60	2.98	0.02%	0.09%
Gartmorn Dam (SSSI)			0.74	3.12	0.02%	0.09%
Howierig Muir (SSSI)			0.76	3.14	0.02%	0.10%
Linlithgow Loch (SSSI)			0.94	3.32	0.03%	0.10%
Linn Mill (SSSI)			0.80	3.18	0.02%	0.10%
Lochcote Marsh (SSSI)			0.97	3.35	0.03%	0.10%
Lockshaw Mosses (SSSI)			0.88	3.26	0.03%	0.10%
Petershill (SSSI)			0.85	3.23	0.03%	0.10%
Philpstoun Muir (SSSI)			1.05	3.43	0.03%	0.10%
Steelend Moss (SSSI)			0.78	3.16	0.02%	0.10%
Wester Moss (SSSI)			0.58	2.96	0.02%	0.09%
Black Loch Moss (SSSI, SAC)			0.63	3.01	0.02%	0.09%
Slamannan Plateau (SSSI, SPA)			0.66	3.04	0.02%	0.09%
Firth Of Forth (north shore) (SSSI, SPA)			1.48	3.86	0.04%	0.12%

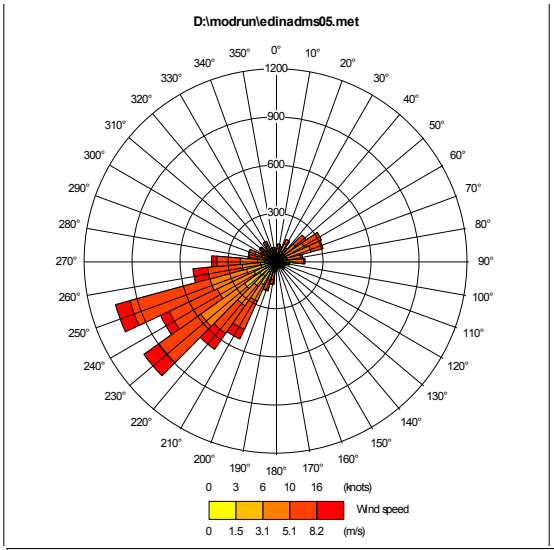
C.7 Dispersion Modelling Results – Auxiliary Boilers

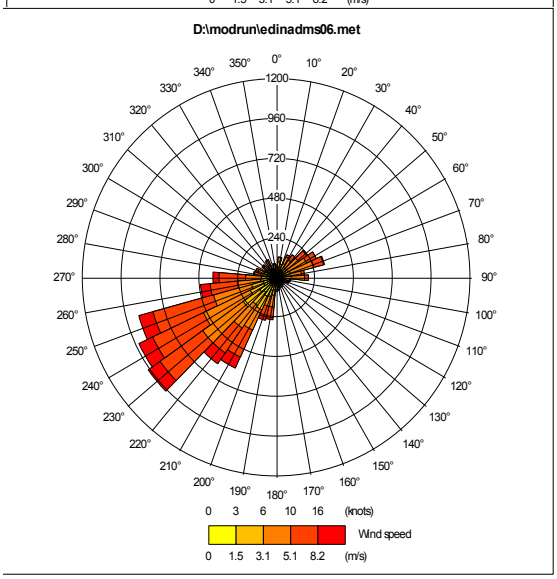
Table C.16: Dispersion modelling results for the auxiliary boiler

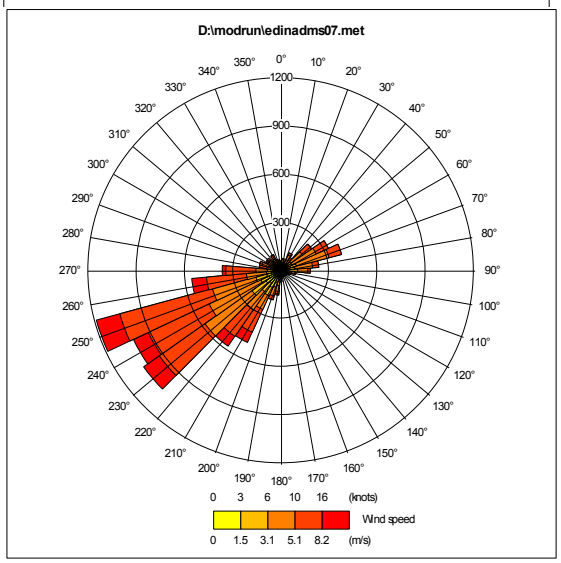
Pollutant	Averaging period	EQS (µg/m³)	Adopted ambient air quality level (µg/m³)	PC (µg/m³)	PEC (µg/m³)	PC / EQS (%)	PEC / EQS (%)	Year of met dataset* resulting in maximum PC
NO_2	1 hour mean (99.8th %ile)	200	54.8	10.3	65.1	5.2%	33%	2008
PM_{10}	24 hour mean (98.08th %ile) (method 1)	50	33.9	4.7	38.7	9.5%	77%	2007
	24 hour mean (98.08th %ile) (method 2)	50	32.1	6.3	38.5	12.7%	77%	2007
SO_2	15 minute mean (99.9th %ile) (method 1)	266	22.3	110.0	132.3	41.3%	50%	2008
	1 hour mean (99.9th %ile) (method 2)	266	22.3	147.4	169.7	55.4%	64%	2008
	1 hour mean (99.73th %ile)	350	22.3	50.9	73.3	14.6%	21%	2008
	24 hour mean (99.18th %ile)	125	22.3	24.2	46.5	19.3%	37%	2004

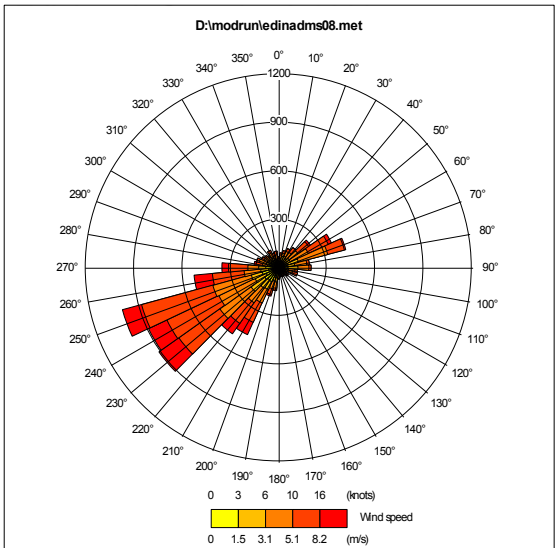
Figure C1.1 – Wind roses for Meteorological data used in this study

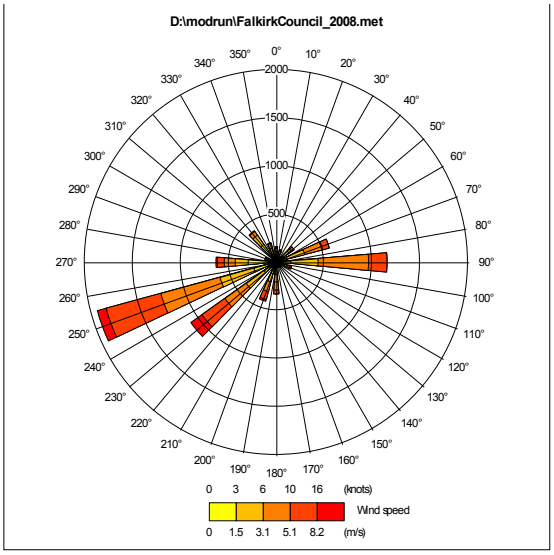












Forth Energy

Appendix D

Noise & Vibration Supporting Information

Contents

D.1 Background Noise Survey

Measurement Procedure

The noise survey, completed for the purpose of this section of the Environmental Statement, was carried out over daytime and night-time periods during 27-30 January and 2-5 February 2010.

A manned noise survey, comprising short period sample measurements of 5-10 minutes duration, was carried out in rotation at the four off-site community reference positions 1-4. In each case the microphone was located at a height of 1.2 m above ground level.

Measurements were recorded in accordance with procedures outlined in BS4142: 1997[1], with noise samples recorded in terms of the following parameters:

- Laeq, the equivalent continuous noise level;
- La10, La50, La90 percentile levels; and
- Lamax, Lamin.

Briefly, Laeq the equivalent continuous noise level is used as the measure of total ambient noise or noise from a specific source. La10, La50 and La90 represent the noise levels exceeded for 10%, 50% and 90% of the time respectively. La90 is defined in BS4142, as the measure of background noise, when it is applied to the residual noise level (the noise in the absence of the specific noise being assessed). Lamax, Lamin represent the maximum and minimum noise levels over the sample period.

The following instrumentation was used to measure noise levels during the survey:

- 1 x Bruel & Kjaer Type 2260 Sound Level Meter (s/n 1772229); and
- 1 x Bruel & Kjaer Type 4230 Acoustic Calibrator.

The sound level meter, calibrator and microphone are calibrated biennially using equipment referenced to the British Calibration Service and The National Physical Laboratory. Calibration certificates are available.

Weather conditions for the survey were dry throughout, light to moderate winds (0-5 m/s) from the SW, W and NW during the first four nights of Jan 27-30 and then light from the W on Feb 2 and light NE on Feb 4 and 5. This variety of wind directions enabled a range of propagation conditions to be considered.

[1] BS 4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas

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D.2 Survey Results (Positions 1,2 3, and 4)

ENVIRONMENTAL NOISE RECORD SHEET

Location: Grangemouth – Position 1, 3 Grangeburn Road
Date: 27/01/2010 to 05/02/2010
Calibration Times: 22:30, 04:00, 23:00, 06:00, 22:45, 05:30, 03:00
Project: Forth Energy Grangemouth Renewable Energy Plant
Instrumentation: B&K 2260 s/n 2027587, B&K 2260 s/n 1772229
Plant Operating Condition: N/A

Date	Time		Weather			Noise Level dB(A)						Comments
	Start	Dur'n (Min)	Wind Speed m/s	Wind Dir'n	Cloud (%)	L_{10}	L_{50}	L_{90}	LF_{MAX}	L_{MIN}	L_{Aeq}	(Including description of noise (eg whine, hiss, rumble, impact, vehicle rain, vegetation, or animal noise).
27/01/2010	01:47	5	2-5	SW	90	44.0	42.2	40.8	57.6	38.8	42.9	Industrial noise coming from the west, distant traffic, running water.
28/01/2010	02:01	5	Calm	NW	70	40.2	37.6	36.2	47.1	34.7	38.5	Industrial noise coming from the west, traffic, running water, birdsong.
28/01/2010	05:28	5	0-5	NW	70	47.4	45.2	44.2	52.2	43.0	45.9	Industrial noise coming from the west, traffic, running water, birdsong.
28/01/2010	15:13	10	0-5	W	100	56.6	53.4	51.6	70.0	49.6	55.4	Road traffic, building work at house on corner.
29/01/2010	01:00	5	2	NW	100	43.2	40.2	38.6	48.2	36.7	41.2	Industrial noise coming from the west, traffic, running water, birdsong.
29/01/2010	03:20	5	0-2	NW	60	43.0	39.0	37.4	52.3	36.2	40.5	Industrial noise coming from the west, traffic, running water, birdsong.
30/01/2010	01:39	5	Calm	NW	10	40.0	37.8	36.4	57.5	35.1	39.3	Industrial noise coming from the west, traffic, running water, birdsong.
02/02/2010	01:42	5	1	W	80	43.8	42.4	41.2	59.1	38.9	42.8	Industrial noise coming from the west, distant traffic, distant alarm
02/02/2010	02:29	5	1	W	60	45.6	43.8	42.2	54.5	40.9	44.7	Industrial noise coming from the west, distant traffic, birdsong
04/02/2010	16:14	10	1	NE	90	61.6	54.4	49.4	73.5	47.4	58.4	Distant traffic, lorries at DHL, plant from port, reverse alarm
04/02/2010	01:23	5	1	NE	90	49.4	47.4	46.2	59.3	44.5	48.2	Refinery plant, vehicles at port, reverse alarms, running water
05/02/2010	02:05	5	1	NE	90	49.0	47.4	46.2	51.8	45.1	47.7	Refinery plant, vehicles at port, reverse alarms, running water

Date	Time	dB(A)	Octave Band Pressure Level									Comments
			31	63	125	250	500	1k	2k	4k	8k	

ENVIRONMENTAL NOISE RECORD SHEET

Location: Grangemouth – Position 2, Newton Road
Date: 27/01/2010 to 5/02/2010
Calibration Times: 22:30, 04:00, 23:00, 06:00, 22:45, 05:30, 03:00
Project: Forth Energy Grangemouth Renewable Energy Plant
Instrumentation: B&K 2260 s/n 2027587, B&K 2260 s/n 1772229
Plant Operating Condition: N/A

Date	Time		Weather			Noise Level dB(A)						Comments
	Start	Dur'n (Min)	Wind Speed m/s	Wind Dir'n	Cloud (%)	L_{10}	L_{50}	L_{90}	LF_{MAX}	L_{MIN}	L_{Aeq}	(Including description of noise (eg whine, hiss, rumble, impact, vehicle rain, vegetation, or animal noise).
27/01/2010	01:21	5	5	SW	90	49.2	47.0	45.4	53.4	42.9	47.6	Road traffic noise from M9
28/01/2010	01:41	5	Calm	NW	70	43.6	41.4	39.0	51.1	35.6	41.8	Road traffic noise from M9
28/01/2010	05:12	5	0-5	NW	70	51.0	49.2	47.4	58.1	45.6	49.5	Road traffic noise from M9
28/01/2010	14:43	10	0-5	W	100	56.6	55.4	54.6	69.8	53.3	55.8	Road traffic noise from M9
29/01/2010	00:42	5	Calm	NW	100	47.4	44.4	42.0	58.8	39.4	45.3	Road traffic noise from M9
29/01/2010	03:04	5	Calm	NW	60	42.4	39.4	36.0	57.4	32.6	40.7	Road traffic noise from M9
30/01/2010	01:22	5	Calm	NW	10	45.2	41.6	38.8	55.3	36.3	42.7	Road traffic noise from M9
02/02/2010	01:21	5	2	W	90	48.4	45.6	43.6	58.2	41.3	46.4	Road traffic noise from M9, Distant industrial from docks
02/02/2010	02:06	5	5	SW	70	48.4	46.2	42.6	53.1	40.4	46.5	Road traffic noise from M9, Distant industrial from docks
04/02/2010	15:49	10	2	NE	90	49.0	47.2	46.2	62.4	45.1	48.2	Road traffic noise from M9, Distant industrial from docks
05/02/2010	01:03	5	2	NE	80	44.2	42.0	40.6	54.3	39.3	42.9	Road traffic noise from M9, Distant industrial from refinery
05/02/2010	01:46	5	3	NE	80	45.2	42.8	41.0	58.8	39.1	43.4	Road traffic noise from M9, Distant industrial from refinery

Date	Time	dB(A)	Octave Band Pressure Level									Comments
			31	63	125	250	500	1k	2k	4k	8k	

ENVIRONMENTAL NOISE RECORD SHEET

Location: Grangemouth – Position 3, 57 Grangeburn Road
Date: 27/01/2010 to 05/02/2010
Calibration Times: 22:30, 04:00, 23:00, 06:00, 22:45, 05:30, 03:00
Project: Forth Energy Grangemouth Renewable Energy Plant
Instrumentation: B&K 2260 s/n 2027587, B&K 2260 s/n 1772229
Plant Operating Condition: N/A

Date	Time		Weather			Noise Level dB(A)						Comments
	Start	Dur'n (Min)	Wind Speed m/s	Wind Dir'n	Cloud (%)	L10	L50	L90	LFMAX	LMIN	LAeq	(Including description of noise (eg whine, hiss, rumble, impact, vehicle rain, vegetation, or animal noise).
27/01/2010	01:58	5	2-5	SW	90	41.6	39.8	38.8	52.3	37.3	40.4	Industrial from west, traffic, activity in DHL depot, birdsong.
28/01/2010	02:08	5	Calm	NW	70	38.4	36.4	35.2	60.0	34.5	40.8	Industrial from west, traffic, activity in DHL depot, birdsong.
28/01/2010	05:35	5	0-5	NW	70	48.4	47.2	46.4	54.2	45.4	47.5	Industrial from west, traffic, increased activity in DHL depot & container store, birdsong.
28/01/2010	15:26	10	0-5	W	100	60.0	50.6	48.4	79.2	47.4	58.8	Road traffic, activity in DHL depot, birdsong.
29/01/2010	01:08	5	2-4	NW	100	52.6	48.8	47.0	62.2	45.0	50.2	Lorry idling outside DHL depot, HGV movements, banging.
29/01/2010	03:27	5	0-2	NW	60	53.6	43.2	40.8	67.1	39.7	50.1	Industrial from west, traffic, activity in DHL depot, birdsong.
30/01/2010	01:47	5	Calm	NW	10	39.2	36.4	34.8	49.1	33.5	37.4	Industrial from west, traffic, birdsong.
02/02/2010	01:53	5	2	W	70	43.8	41.0	40.0	58.7	39.0	42.6	Industrial from west, traffic, running water, DHL gate closing.
02/02/2010	02:37	5	2	W	60	43.0	41.0	39.6	55.5	38.1	41.7	Industrial from west, traffic, running water, helicopter.
04/02/2010	16:24	10	2	NE	90	60.2	54.8	51.8	72.8	50.0	58.2	Distant road traffic, vehicles at port, reverse alarms, distant refinery.
05/02/2010	01:33	5	2	NE	90	57.4	53.4	51.4	65.7	49.3	55.2	Refinery plant, vehicles at port, lorries at DHL.
05/02/2010	02:14	5	1	NE	90	52.2	50.8	49.8	55.5	48.7	51.2	Refinery plant, vehicles at port.

Date	Time	dB(A)	Octave Band Pressure Level									Comments
			31	63	125	250	500	1k	2k	4k	8k	

ENVIRONMENTAL NOISE RECORD SHEET

Location: Grangemouth – Position 4, Dalgrain Road
Date: 27/01/2010 to 05/02/2010
Calibration Times: 22:30, 04:00, 23:00, 06:00, 22:45, 05:30, 03:00
Project: Forth Energy Grangemouth Renewable Energy Plant
Instrumentation: B&K 2260 s/n 2027587, B&K 2260 s/n 1772229
Plant Operating Condition: N/A

Date	Time		Weather			Noise Level dB(A)						Comments
	Start	Dur'n (Min)	Wind Speed m/s	Wind Dir'n	Cloud (%)	L_{10}	L_{50}	L_{90}	LF_{MAX}	L_{MIN}	L_{Aeq}	(Including description of noise (eg whine, hiss, rumble, impact, vehicle rain, vegetation, or animal noise).
27/01/2010	01:36	5	3	SW	90	51.4	48.6	47.2	68.4	46.0	52.3	Noise from industrial plant to the south, distant traffic, truck passed by.
28/01/2010	01:50	5	Calm	NW	70	48.0	46.4	45.4	60.5	44.4	47.1	Noise from industrial plant to the south, distant traffic.
28/01/2010	05:20	5	0-5	NW	70	57.2	53.4	51.6	70.5	49.8	55.2	Noise from industrial plant to the south, distant traffic, banging nearby.
28/01/2010	14:58	10	0-5	W	100	70.0	63.2	57.0	84.7	53.9	67.4	Noise from industrial plant to the south, distant traffic, HGV's on Forth Clyde Way.
29/01/2010	00:51	5	Calm	NW	100	48.8	45.4	43.0	60.1	41.8	47.2	Noise from industrial plant to the south, distant traffic.
29/01/2010	03:12	5	Calm	NW	60	42.4	40.8	40.0	56.1	38.5	41.9	Noise from industrial plant to the south, distant traffic.
30/01/2010	01:31	5	Calm	NW	10	50.6	45.6	44.2	62.2	43.2	49.1	Noise from industrial plant to the south, distant traffic.
02/02/2010	01:31	5	2	W	80	55.0	50.2	48.2	75.7	46.9	56.0	Noise from industrial plant to the south, distant traffic.
02/02/2010	02:19	5	2	SW	70	51.0	49.2	48.2	59.3	46.8	49.9	Noise from industrial plant to the south, distant traffic. Reverse alarm.
04/02/2010	16:02	10	1	NE	90	67.6	61.0	55.2	82.7	50.4	65.8	Noise from industrial plant to the south, local traffic, lorries.
05/02/2010	01:13	5	1	NE	90	55.2	44.6	43.2	81.0	41.9	60.1	Noise from industrial plant to the south, industrial from refinery, distant traffic.
05/02/2010	01:56	5	3	NE	90	48.4	44.4	43.4	60.7	42.0	47.1	Noise from industrial plant to the south, industrial from refinery, distant traffic.

Date	Time	dB(A)	Octave Band Pressure Level									Comments
			31	63	125	250	500	1k	2k	4k	8k	

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D.3 Noise Calculation Tables for Construction Works, Positions 1-4

CONSTRUCTION

Prediction of construction noise to Position 1, 3 Grangeburn Road

Construction Activity	Site Perimeter LAeq (1 hour) dB(A)	Site sound power level dB(A)	Corrections			LAeq dB(A)
			Distance	Screen	Ref.n	
1 Clearing site	70	120	-60	-3	+3	60
2 Ground prep. Works and piling	73	123	-60	-3	+3	63
3 On site road works	67	117	-60	-3	+3	57
4 Excavation	64	114	-60	-3	+3	54
5 Foundations and concreting	66	116	-60	-3	+3	56
6 Major plant erection & installation	64	114	-60	-3	+3	54
BS 5228 threshold of significance-day	LAeq (1 hour)					65

Note: Sound pressure level to sound power level correction for construction site surface area +50dB(A)

Prediction of construction noise to Position 2, Newton Road

Construction Activity	Site Perimeter LAeq (1 hour) dB(A)	Site sound power level dB(A)	Corrections			LAeq dB(A)
			Distance	Screen	Ref.n	
1 Clearing site	70	120	-66	-6	+3	51
2 Ground prep. Works and piling	73	123	-66	-6	+3	54
3 On site road works	67	117	-66	-6	+3	48
4 Excavation	64	114	-66	-6	+3	45
5 Foundations and concreting	66	116	-66	-6	+3	47
6 Major plant erection & installation	64	114	--66	-6	+3	45
BS 5228 threshold of significance-day	LAeq (1 hour)					65

Prediction of construction noise to Position 3, 57 Grangeburn Road

Construction Activity	Site Perimeter LAeq (1 hour) dB(A)	Site sound power level dB(A)	Corrections			LAeq dB(A)
			Distance	Screen	Ref.n	
1 Clearing site	70	120	-60	-3	+3	60
2 Ground prep. Works and piling	73	123	-60	-3	+3	63
3 On site road works	67	117	-60	-3	+3	57
4 Excavation	64	114	-60	-3	+3	54
5 Foundations and concreting	66	116	-60	-3	+3	56
6 Major plant erection & installation	64	114	-60	-3	+3	54
BS 5228 threshold of significance-day	LAeq (1 hour)					65

Prediction of construction noise to Position 4, Dalgrain Road

Construction Activity		Site Perimeter LAeq (1 hour) dB(A)	Site sound power level dB(A)	Corrections			
				Distance	Screen	Ref.n	
1	Clearing site	70	120	-64	-3	+3	56
2	Ground prep. Works and piling	73	123	-64	-3	+3	59
3	On site road works	67	117	-64	-3	+3	53
4	Excavation	64	114	-64	-3	+3	50
5	Foundations and concreting	66	116	-64	-3	+3	52
6	Major plant erection & installation	64	114	-64	-3	+3	50
BS 5228 threshold of significance-day		LAeq (1 hour)					65

D.4 Noise Calculation Tables for Demolition Works, Positions 1-4

DECOMMISSIONING (DEMOLITION)

Prediction of Demolition works noise to Position 1, 3 Grangeburn Road

Plant type	Average	Dist.	Adjustments			Resultant	On-time	Activity
	LWA dB	(m)	Dist.	Screen	Ref.n	LpA dB	%	LAeq(1hr)
BS 5228: Part 1 – Stage	2	3	4	5	6	7		
Tracked crane with drop ball	121	390	-60	-3	+3	61	50	58
28t Articulated Dump Truck	108	390	-60	-3	+3	48	50	45
Excavator fitted with breaker	119	390	-60	-3	+3	59	50	56
Pneumatic breaker	116	390	-60	-3	+3	56	50	53
Tractor & Bowser	111	390	-60	-3	+3	51	50	48
Typical maximum level								61

Prediction of Demolition works noise to Position 2, Newton Road

Plant type	Average	Dist.	Adjustments			Resultant	On-time	Activity
	LWA dB	(m)	Dist.	Screen	Ref.n	LpA dB	%	LAeq(1hr)
BS 5228: Part 1 – Stage	2	3	4	5	6	7		
Tracked crane with drop ball	121	1,950	-66	-6	+3	52	50	49
28t Articulated Dump Truck	108	1,950	-66	-6	+3	39	50	36
Excavator fitted with breaker	119	1,950	-66	-6	+3	50	50	47
Pneumatic breaker	116	1,950	-66	-6	+3	47	50	44
Tractor & Bowser	111	1,950	-66	-6	+3	42	50	39
Typical maximum level								52

Prediction of Demolition works noise to Position 3, 57 Grangeburn Road

Plant type	Average	Dist.	Adjustments			Resultant	On-time	Activity
	LWA dB	(m)	Dist.	Screen	Ref.n	LpA dB	%	LAeq(1hr)
BS 5228: Part 1 – Stage	2	3	4	5	6	7		
Tracked crane with drop ball	121	390	-60	-3	+3	61	50	58
28t Articulated Dump Truck	108	390	-60	-3	+3	48	50	45
Excavator fitted with breaker	119	390	-60	-3	+3	59	50	56
Pneumatic breaker	116	390	-60	-3	+3	56	50	53
Tractor & Bowser	111	390	-60	-3	+3	51	50	48
Typical maximum level								61

Prediction of Demolition works noise to Position 4, Dalgrain Road

Plant type	Average	Dist.	Adjustments			Resultant	On-time	Activity
	L_{WA} dB	(m)	Dist.	Screen	Ref.n	L_{pA} dB	%	$L_{Aeq(1hr)}$
BS 5228: Part 1 – Stage	2	3	4	5	6	7		
Tracked crane with drop ball	121	1,500	-64	-3	+3	57	50	54
28t Articulated Dump Truck	108	1,500	-64	-3	+3	44	50	41
Excavator fitted with breaker	119	1,500	-64	-3	+3	55	50	52
Pneumatic breaker	116	1,500	-64	-3	+3	52	50	49
Tractor & Bowser	111	1,500	-64	-3	+3	47	50	44
Typical maximum level								58

D.5 Operating Noise Model Data

Equipment sound power and outline mitigation table

3D image of the site and surround terrain

Rank ordered noise source contributions to positions 1 and 3

Datasheet for 'Predictor'

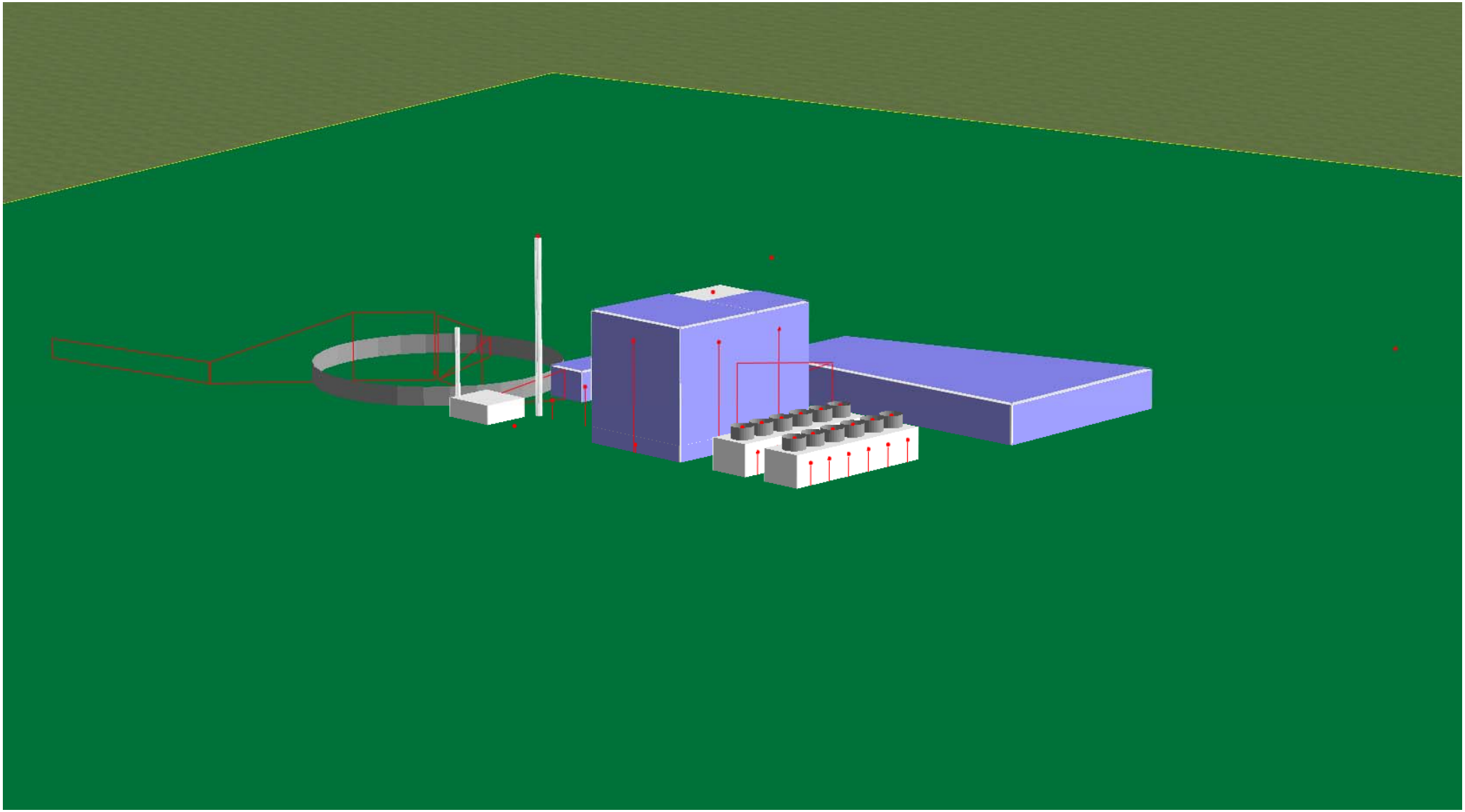
Equipment sound power levels

Project : Grangemouth REP

Run no: Rev 5 with noise mitigation

Date: 21-Jun-10

Equipment sound power data	Overall Sound Power Level dB(A)	Octave Band Sound Power Level (dB), (un-weighted)									Comments	SAC estimated factor Lwa - Lpa	SAC estimated log. average Lpa at specified distance (m)
		31Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	8 KHz			
Cooling tower intakes (total of all cells)	**105**	108	104	103	102	102	101	97	94	90	12x11m dia fans	30	76 at 5m
Cooling tower discharges (total of all cells)	**105**	118	113	110	108	102	99	93	89	86	12x11m dia fans	30	76 at 5m
Steam turbine hall	**88**	106	106	102	90	74	64	59	59	59	SAC data. Acoustically lined steel clad building	38	50 at 1m
Steam turbine hall ventilation louvres	**88**	100	100	99	88	81	78	77	79	79	SAC data. 100m2 of acoustic louvre spread between 2 sides. (W and S)	20	68 at 1m
Transformer - main 33kV	**89**	88	91	89	91	90	76	72	66	56	SAC data	22	67 at 5m
Generator Fin-fan Cooler	**97**	89	102	102	98	95	91	87	81	77	SAC data. 6x3m dia fans	24	73 at 5m
Boilerhouse walls below 8m	**97**	119	119	109	97	81	70	63	61	61	SAC data. Acoustically lined steel clad building	31	66 at 1m
Boilerhouse walls (N only) and roof above 8m	**95**	117	117	107	95	79	68	61	59	59	SAC data. Acoustically lined steel clad building	37	58 at 1m
Boilerhouse walls (W and E only) above 8m	**89**	111	111	100	90	79	68	61	59	59	Acoustic panel with heavy and non-perforated inner face for enhanced low frequency insulation	37	52 at 1m
Boilerhouse louvres - high level	**90**	119	109	97	85	80	80	80	80	80	200m2 acoustic louvres spread between 3 sides (W,N and E) assumed (Colt R)	23	67 at 1m
Boilerhouse louvres - low level	**95**	124	114	101	90	85	85	85	85	85	200m2 acoustic louvres spread between 3 sides (W, N and E) assumed (Colt R)	23	72 at 1m
ID Fan House	**96**	115	115	105	98	90	85	82	80	80	SAC data. Fan and motor in acoustic enclosure	26	70 at 1m
Main Flue Gas Stack Outlet	**95**	113	110	100	93	90	89	86	84	84	SAC data. Discharge silencer fitted to i/d fan	-	-
Flue gas bag filters and heat exchanger	**90**	108	108	99	91	82	80	81	75	70	SAC data. Very large source. Fan inlet silencer assumed.	28	62 at 1m
Reception, admin and control building - air con and vent fans	**92**	70	77	86	82	79	85	87	85	81	SAC data. Various units at 70 dB(A) at 1m	-	-
Day fuel store	**80**	76	73	75	74	74	76	74	69	60	SAC data. Standard steel clad building	36	44 at 1m
Screening building	**86**	82	79	81	80	80	82	80	75	66	SAC data. Standard steel clad building	34	52 at 1m
Enclosed mixed fuel storage building	**86**	82	79	81	80	80	82	80	75	66	SAC data. Standard steel clad building	44	42 at 1m
Open stockpile main fuel storage reclaimer drive motor	**101**	94	94	99	99	96	96	94	91	89	SAC data. Electric motor drive.	24	77 at 3m
Inclined conveyor feeding the open stockpile (Total 220m)	**89**	100	96	92	89	84	82	82	80	77	High quality conveyor enclosed in an acoustic panelled structure.	36	53 at 1m
Horizontal stacker conveyor above the open stockpile (Total 45m)	**81**	92	88	84	82	76	74	74	72	69	High quality conveyor enclosed in an acoustic panelled structure.	28	53 at 1m
Inclined belt conveyor from Day Store and Mixed Fuel Store (Total 90m)	**85**	96	92	88	85	80	78	78	76	73	High quality conveyor enclosed in an acoustic panelled structure.	32	53 at 1m
Mixed Fuel Store to Feed Silos inclined belt conveyor (150m total)	**88**	99	95	91	88	83	81	81	79	76	High quality conveyor enclosed in an acoustic panelled structure.	35	53 at 1m
Open Stockpile to Screen inclined belt conveyor (Total 50m)	**82**	93	89	85	82	77	75	75	73	70	High quality conveyor enclosed in an acoustic panelled structure.	29	53 at 1m
Bucket Elevator between Screen and Day Store (Total 15m)	**82**	93	89	85	82	77	75	75	73	70	Acoustically enclosed bucket elevator.	24	58 at 1m
Open stockpile main fuel storage reclaimer boom	**101**	94	94	99	99	96	96	94	91	89	SAC estimate.	28	73 at 1m
Emergency generator	**-**										Runs only during and emergency		



Receptor 1 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS1_A - POS 1
Group: (main group)
Group Reduction: No

Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
POS1_A	POS 1	1.50	38	22	30	31	30	30	31	28	19	-9
	Reclaimer Boom	0.00	28	-15	-2	13	20	22	24	20	7	-30
	Reclaimer electric motor power unit	3.00	28	-14	-2	13	19	22	23	19	6	-34
4	Reception, admin and control building	45.00	26	-31	-11	8	12	13	21	23	14	-15
1	Team Turbine Hall	0.00	25	3	17	23	19	7	-1	-5	-13	-38
12	Boilerhouse louvre - high level	55.00	25	17	20	18	14	13	15	14	7	-22
2	Boilerhouse above 8m	8.00	25	8	21	20	18	11	2	-5	-15	-43
	Team Turbine Hall	0.00	24	3	16	22	17	6	-2	-7	-14	-40
	Enclosed Mixed Fuel Store	0.00	24	-18	-8	4	11	16	20	18	10	-15
1	Steam Turbine ventilation louvre	55.00	24	-2	11	20	16	14	14	12	8	-17
	Mixed Fuel Store to Feed Silos inclined belt	45.00	24	-3	6	13	17	17	17	17	8	-21
2	Steam Turbine ventilation louvre	55.00	23	-2	11	20	15	14	13	11	7	-19
3	Boilerhouse below 8m	0.00	22	10	20	17	8	-5	-17	-26	-35	-64
	ID Fan House	10.00	22	8	19	17	14	8	3	-4	-16	-47
1	Enclosed Mixed Fuel Store	0.00	21	-20	-10	2	9	13	18	16	7	-18
2	Boilerhouse below 8m	0.00	21	9	19	16	8	-6	-17	-26	-34	-63
	Boilerhouse above 8m	66.00	21	5	18	17	11	0	-10	-19	-29	-58
	Inclined conveyor feeding the Open Stockpile	35.00	20	-5	4	10	14	13	14	13	2	-38
1	Main Stack	90.00	20	4	14	13	13	12	12	8	-2	-35
4	Boilerhouse below 8m	0.00	19	7	17	13	4	-9	-18	-26	-35	-66
2	Bag filters and heat exchanger	20.00	18	1	13	13	11	6	4	2	-14	-52
37	Cooling tower discharges	21.00	18	0	6	11	14	10	6	0	-12	-40
43	Cooling tower discharges	21.00	18	0	6	11	14	10	7	-3	-12	-41
42	Cooling tower discharges	21.00	17	-1	6	11	14	10	6	-4	-13	-42
36	Cooling tower discharges	21.00	17	0	6	11	14	10	6	0	-13	-42
16	Boilerhouse louvre - low level	4.00	17	13	14	8	1	-2	-3	-4	-11	-40
3	Boilerhouse above 8m	8.00	17	3	14	12	8	1	-8	-15	-25	-54
26	Cooling tower intakes	11.00	17	-9	-2	6	10	13	11	4	-9	-45
41	Cooling tower discharges	21.00	17	-1	5	10	13	9	6	-1	-14	-44
35	Cooling tower discharges	21.00	17	-1	5	10	13	9	5	-1	-13	-43
34	Cooling tower discharges	21.00	17	-1	5	10	13	9	9	-1	-14	-45
27	Cooling tower intakes	11.00	17	-9	-2	6	10	13	11	4	-9	-44
4	Boilerhouse above 8m	8.00	17	5	15	11	3	-10	-20	-28	-37	-68
28	Cooling tower intakes	11.00	17	-9	-2	6	9	12	11	3	-9	-44
33	Cooling tower discharges	21.00	16	-1	5	9	13	8	8	-2	-15	-46
40	Cooling tower discharges	21.00	16	-1	5	10	13	9	5	-1	-14	-45
1	Stacker Arm	33.00	16	-9	0	6	11	9	9	9	-2	-38
29	Cooling tower intakes	11.00	16	-9	-2	6	9	12	10	3	-9	-43
32	Cooling tower discharges	21.00	16	-2	4	9	12	8	8	-2	-15	-48
38	Cooling tower discharges	21.00	16	-2	4	9	12	8	7	-2	-15	-48
39	Cooling tower discharges	21.00	16	-2	5	9	13	8	5	-2	-15	-47

All shown dB values are A-weighted

Receptor 1 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS1_A - POS 1
Group: (main group)
Group Reduction: No

Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
30	Cooling tower intakes	11.00	16	-9	-2	5	9	12	10	3	-10	-42
15	Boilerhouse louvre - low level	4.00	16	11	12	6	0	-4	-4	-7	-14	-44
31	Cooling tower intakes	11.00	15	-9	-2	5	8	11	10	2	-10	-41
3	Screen Building	0.00	15	-24	-14	-3	4	8	12	9	-3	-41
	Enclosed Mixed Fuel Store	21.00	15	-25	-16	-4	3	7	11	9	0	-28
1	Screen Building	0.00	13	-28	-20	-5	2	5	9	6	-6	-46
5	Reception, admin and control building	66.00	13	-42	-22	-3	0	1	9	9	-2	-35
20	Cooling tower intakes	11.00	12	-12	-5	2	5	7	6	-2	-15	-48
15	Cooling tower intakes	11.00	12	-13	-6	1	4	6	7	-1	-12	-45
21	Cooling tower intakes	11.00	12	-12	-5	2	5	7	6	-2	-15	-47
7	Heat accumulator pump	0.50	11	-20	-10	2	5	5	6	3	-8	-43
22	Cooling tower intakes	11.00	11	-12	-5	1	4	7	5	-3	-14	-46
17	Cooling tower intakes	11.00	11	-13	-6	0	3	6	7	-1	-11	-42
	Team Turbine Hall	66.00	11	-10	3	9	4	-8	-16	-21	-29	-56
14	Cooling tower intakes	11.00	11	-13	-6	1	4	7	5	0	-13	-46
23	Cooling tower intakes	11.00	11	-12	-5	1	4	7	5	-3	-14	-44
18	Cooling tower intakes	11.00	11	-13	-6	0	3	6	6	-1	-11	-40
16	Cooling tower intakes	11.00	11	-13	-6	1	4	6	4	-1	-12	-43
24	Cooling tower intakes	11.00	11	-12	-6	1	4	6	5	-3	-13	-43
14	Boilerhouse louvre - low level	4.00	11	7	7	1	-6	-8	-6	-7	-15	-45
19	Cooling tower intakes	11.00	10	-13	-7	0	3	5	6	-1	-10	-39
25	Cooling tower intakes	11.00	10	-12	-6	0	3	6	4	-3	-12	-41
5	Generator Fin-fan Cooler	4.50	10	-26	-3	4	5	3	-1	-6	-17	-44
12	Cooling tower intakes	11.00	9	-14	-7	-1	2	5	3	-4	-13	-43
11	Boilerhouse louvre - high level	55.00	9	5	6	1	-6	-10	-11	-14	-21	-51
10	Generator Fin-fan Cooler	4.50	9	-26	-3	4	4	3	-1	-5	-17	-45
4	Main Transformer	5.00	9	-19	-6	-1	5	6	-6	-11	-23	-58
13	Cooling tower intakes	11.00	9	-14	-7	-1	2	5	3	-4	-13	-42
6	Generator Fin-fan Cooler	4.50	9	-27	-4	3	4	2	-1	-6	-17	-45
8	Generator Fin-fan Cooler	4.50	9	-27	-4	3	4	2	-1	-5	-17	-45
7	Generator Fin-fan Cooler	4.50	8	-27	-4	3	3	2	-1	-6	-17	-45
9	Generator Fin-fan Cooler	4.50	8	-27	-5	2	3	2	-1	-5	-17	-44
2	Bucket Elevator	0.50	8	-12	-6	2	4	1	-2	-6	-17	-50
	Inclined conv. from Mixed Fuel and Day Store	15.00	8	-9	-2	1	3	0	-3	-5	-15	-44
3	Steam Turbine ventilation louvre	4.00	6	-12	-2	4	-4	-8	-10	-12	-16	-42
	Steam Turbine ventilation louvre	4.00	5	-13	-3	3	-5	-9	-10	-11	-15	-40
11	Cooling tower intakes	11.00	5	-19	-13	-8	-5	-1	0	-4	-14	-45
13	Boilerhouse louvre - high level	55.00	5	1	1	-5	-12	-15	-13	-14	-22	-53
	Screen Building	16.00	4	-30	-20	-10	-4	-2	1	-5	-19	-59
10	Cooling tower intakes	11.00	4	-19	-14	-8	-6	-1	0	-5	-14	-46

All shown dB values are A-weighted

Receptor 1 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS1_A - POS 1
Group: (main group)
Group Reduction: No

Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
9	Cooling tower intakes	11.00	4	-20	-14	-8	-6	-1	0	-5	-15	-47
8	Cooling tower intakes	11.00	4	-20	-14	-8	-5	-2	0	-5	-15	-49
	Screen Building	0.00	4	-26	-18	-8	-4	-2	-1	-6	-21	-60
	Open Stockpile to Screen inclined belt conv	15.00	3	-15	-8	-4	-2	-4	-7	-9	-20	-56
2	Enclosed Mixed Fuel Store	0.00	3	-32	-25	-15	-10	-8	1	-3	-16	-51
3	Reception, admin and control building	45.00	3	-50	-33	-15	-11	-10	-2	-1	-9	-40
2	Screen Building	0.00	-1	-31	-24	-14	-9	-7	-6	-11	-24	-64
3	Enclosed Mixed Fuel Store	0.00	-2	-31	-24	-14	-10	-8	-7	-12	-24	-56
2	Day Fuel Store	0.00	-3	-36	-28	-19	-11	-9	-7	-12	-27	-66
	Day Fuel Store	16.00	-5	-36	-28	-18	-13	-11	-8	-14	-29	-67
1	Day Fuel Store	0.00	-7	-35	-28	-19	-15	-13	-11	-16	-28	-63
	Day Fuel Store	0.00	-9	-39	-32	-24	-20	-16	-13	-17	-29	-66
3	Day Fuel Store	0.00	-10	-39	-31	-22	-18	-17	-14	-18	-30	-65

All shown dB values are A-weighted

Receptor 3 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS3_A - POS 3
Group: (main group)
Group Reduction: No

Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
POS3_A	POS 3	1.50	40	23	31	32	33	33	33	31	21	-9
	Reclaimer electric motor power unit	3.00	30	-12	1	15	21	25	26	22	10	-19
	Reclaimer Boom	0.00	29	-11	1	15	22	24	24	20	10	-16
	ID Fan House	10.00	29	14	26	24	21	16	11	8	-3	-38
4	Main Transformer	5.00	29	-9	7	14	23	27	15	10	-3	-41
2	Bag filters and heat exchanger	20.00	28	7	19	20	20	20	20	20	7	-28
3	Boilerhouse above 8m	8.00	27	10	23	22	20	13	4	-3	-13	-43
	Inclined conveyor feeding the Open Stockpile	35.00	27	0	9	15	20	20	21	20	11	-20
7	Heat accumulator pump	0.50	26	-9	2	16	20	20	20	14	1	-33
	Inclined conv. from Mixed Fuel and Day Store	15.00	26	-1	8	14	19	19	19	20	11	-18
4	Reception, admin and control building	45.00	25	-31	-11	7	11	12	21	22	13	-18
3	Reception, admin and control building	45.00	25	-32	-12	7	11	12	20	22	13	-19
11	Boilerhouse louvre - high level	55.00	25	17	20	18	13	12	15	14	6	-23
1	Team Turbine Hall	0.00	25	3	16	22	18	6	-2	-7	-15	-43
3	Boilerhouse below 8m	0.00	24	12	22	19	11	-3	-15	-22	-33	-65
	Mixed Fuel Store to Feed Silos inclined belt	45.00	23	-3	6	12	17	16	17	17	7	-24
1	Steam Turbine ventilation louvre	55.00	22	-3	10	19	15	13	12	10	5	-23
3	Screen Building	0.00	22	-21	-11	1	10	14	19	16	5	-28
1	Screen Building	0.00	22	-19	-9	3	10	14	19	16	5	-27
1	Main Stack	90.00	21	5	15	14	14	13	14	10	0	-29
2	Bucket Elevator	0.50	20	-10	-2	10	14	14	14	13	5	-23
	Screen Building	0.00	20	-26	-18	-8	9	13	17	14	3	-32
	Boilerhouse above 8m	66.00	20	4	17	16	10	-1	-11	-21	-32	-63
15	Boilerhouse louvre - low level	4.00	20	16	16	10	4	0	-1	3	-7	-41
	Enclosed Mixed Fuel Store	0.00	20	-21	-11	1	8	12	16	14	3	-29
4	Boilerhouse below 8m	0.00	20	7	18	14	5	-8	-19	-26	-36	-68
1	Stacker Arm	33.00	19	-7	2	8	14	12	12	13	4	-24
32	Cooling tower discharges	21.00	19	0	7	12	16	12	8	-2	-18	-59
42	Cooling tower discharges	21.00	19	-1	6	11	15	11	8	-2	-10	-48
43	Cooling tower discharges	21.00	18	-1	6	11	15	11	8	-2	-12	-50
41	Cooling tower discharges	21.00	18	-2	5	11	15	11	8	-2	-13	-51
4	Boilerhouse above 8m	8.00	18	5	15	12	4	-10	-20	-29	-38	-71
2	Boilerhouse below 8m	0.00	17	5	15	11	7	-5	-16	-25	-35	-68
37	Cooling tower discharges	21.00	17	-2	5	10	14	10	6	-4	-14	-53
35	Cooling tower discharges	21.00	17	-2	5	10	14	10	6	-4	-15	-55
36	Cooling tower discharges	21.00	17	-2	5	10	14	10	6	-4	-15	-54
34	Cooling tower discharges	21.00	17	-2	5	10	14	10	6	-4	-15	-55
33	Cooling tower discharges	21.00	17	-2	5	10	14	10	6	-4	-15	-56
12	Cooling tower intakes	11.00	17	-8	0	7	10	12	11	3	-11	-49
3	Enclosed Mixed Fuel Store	0.00	17	-25	-15	-3	4	9	13	11	0	-31
40	Cooling tower discharges	21.00	16	-1	5	9	12	8	4	-6	-20	-56

All shown dB values are A-weighted

Receptor 3 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS3_A - POS 3
Group: (main group)
Group Reduction: No

Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
24	Cooling tower intakes	11.00	16	-8	-1	6	9	11	9	1	-13	-52
1	Day Fuel Store	0.00	15	-26	-16	-4	2	7	12	9	-2	-35
	Screen Building	16.00	15	-29	-20	-8	0	5	12	11	0	-33
13	Cooling tower intakes	11.00	15	-9	-2	5	8	10	9	1	-13	-48
21	Cooling tower intakes	11.00	15	-12	-4	4	7	10	9	2	-11	-51
	Open Stockpile to Screen inclined belt conv	15.00	14	-9	-1	5	8	8	8	7	-2	-31
	Steam Turbine ventilation louvre	4.00	14	-6	5	13	6	2	-2	-7	-14	-46
2	Enclosed Mixed Fuel Store	0.00	13	-29	-19	-8	2	6	10	8	-4	-42
25	Cooling tower intakes	11.00	13	-11	-4	3	6	9	7	-1	-15	-51
	Enclosed Mixed Fuel Store	21.00	13	-28	-18	-6	0	5	9	8	-3	-35
11	Cooling tower intakes	11.00	13	-11	-4	3	6	9	7	-1	-13	-50
39	Cooling tower discharges	21.00	13	-3	2	6	9	5	1	-9	-21	-57
5	Reception, admin and control building	66.00	12	-42	-22	-3	0	1	8	9	-2	-36
20	Cooling tower intakes	11.00	12	-11	-4	3	6	8	6	-2	-16	-56
	Team Turbine Hall	0.00	12	-4	6	9	3	-11	-22	-29	-38	-68
9	Generator Fin-fan Cooler	4.50	12	-28	-4	6	7	5	1	-6	-20	-55
18	Cooling tower intakes	11.00	12	-16	-10	2	5	7	6	-2	-14	-52
7	Generator Fin-fan Cooler	4.50	12	-27	-4	6	7	5	0	-6	-20	-55
14	Boilerhouse louvre - low level	4.00	11	8	8	2	-5	-8	-7	-8	-16	-48
8	Generator Fin-fan Cooler	4.50	11	-28	-5	6	7	5	0	-6	-20	-55
6	Generator Fin-fan Cooler	4.50	11	-28	-4	6	7	5	0	-6	-20	-56
10	Generator Fin-fan Cooler	4.50	11	-28	-5	6	7	5	0	-6	-20	-56
38	Cooling tower discharges	21.00	11	-4	1	5	7	3	-1	-9	-21	-58
16	Boilerhouse louvre - low level	4.00	11	7	7	1	-6	-5	-5	-6	-14	-47
2	Day Fuel Store	0.00	10	-30	-20	-9	-2	2	7	4	-7	-41
	Team Turbine Hall	66.00	10	-10	2	8	3	-9	-17	-23	-32	-62
22	Cooling tower intakes	11.00	10	-13	-6	1	3	6	4	-4	-16	-54
10	Cooling tower intakes	11.00	10	-13	-7	-1	3	5	4	-3	-14	-51
2	Boilerhouse above 8m	8.00	9	-3	7	3	-2	-12	-21	-28	-39	-71
19	Cooling tower intakes	11.00	9	-13	-7	0	2	5	3	-5	-17	-53
17	Cooling tower intakes	11.00	9	-17	-11	-1	2	4	3	-4	-15	-53
	Day Fuel Store	16.00	9	-36	-26	-14	-6	-1	5	4	-7	-41
31	Cooling tower intakes	11.00	8	-14	-7	-1	2	4	2	-6	-18	-55
16	Cooling tower intakes	11.00	8	-22	-18	-3	1	4	3	-4	-16	-54
15	Cooling tower intakes	11.00	8	-23	-18	-3	1	4	3	-4	-16	-55
23	Cooling tower intakes	11.00	8	-15	-8	-2	1	4	2	-4	-15	-53
5	Generator Fin-fan Cooler	4.50	8	-28	-5	2	3	2	-3	-9	-23	-58
9	Cooling tower intakes	11.00	7	-15	-8	-2	0	3	1	-4	-15	-52
8	Cooling tower intakes	11.00	6	-16	-9	-3	-1	1	1	-4	-16	-53
13	Boilerhouse louvre - high level	55.00	6	2	2	-4	-11	-15	-14	-15	-23	-55

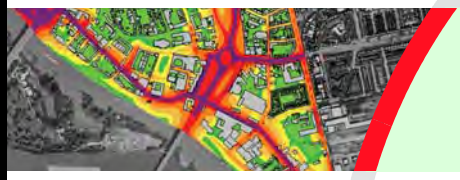
All shown dB values are A-weighted

Receptor 3 contributions

Report: Table of Results
Model: Initial Simulation Rev 5
LAeq per octave: by Source for receiver POS3_A - POS 3
Group: (main group)
Group Reduction: No

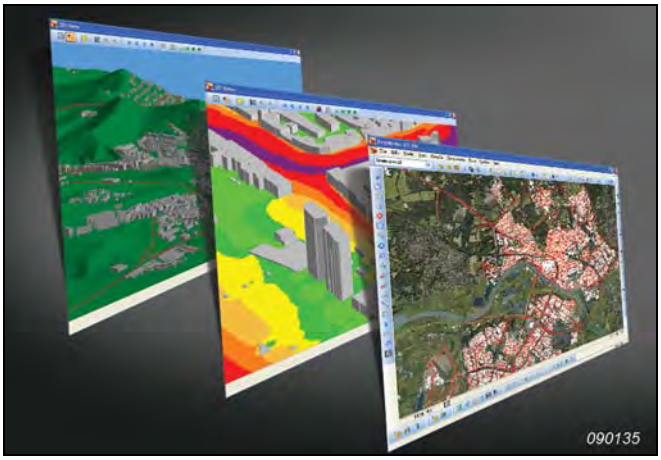
Name Source	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
30	Cooling tower intakes	11.00	5	-16	-10	-4	-2	0	-2	-7	-18	-56
12	Boilerhouse louvre - high level	55.00	5	1	1	-4	-12	-16	-14	-15	-23	-55
2	Screen Building	0.00	5	-29	-21	-11	-4	-1	1	-4	-17	-54
29	Cooling tower intakes	11.00	4	-17	-11	-6	-3	-1	-2	-7	-19	-57
3	Steam Turbine ventilation louvre	4.00	4	-15	-4	2	-5	-10	-14	-16	-21	-51
	Day Fuel Store	0.00	4	-35	-28	-19	-15	-4	1	-2	-15	-54
28	Cooling tower intakes	11.00	3	-18	-12	-6	-4	-2	-2	-7	-19	-58
26	Cooling tower intakes	11.00	2	-19	-13	-8	-7	-3	-2	-8	-20	-60
27	Cooling tower intakes	11.00	2	-20	-14	-9	-8	-3	-2	-8	-19	-59
14	Cooling tower intakes	11.00	2	-23	-18	-13	-8	-3	-2	-7	-19	-57
2	Steam Turbine ventilation louvre	55.00	2	-16	-6	0	-7	-12	-16	-18	-23	-54
3	Day Fuel Store	0.00	-2	-34	-25	-15	-11	-9	-6	-12	-25	-63
1	Enclosed Mixed Fuel Store	0.00	-7	-37	-29	-20	-16	-14	-11	-15	-27	-67

All shown dB values are A-weighted



PRODUCT DATA

Predictor Version 7 — The Intuitive Solution (Types 7810-A/B/C/D/E/F/G)



Predictor™ is the most intuitive environmental noise calculation software package available. It allows you to calculate and analyse noise from various noise sources such as industry or traffic.

The software has a fast learning curve, enabling you to work efficiently, even for infrequent use. Model comparison is easy with its intuitive and unique multi-model view – particularly important for infrequent use, it's easier to remember what to do. You can model real-life quickly, easily and accurately, even in complex situations, e.g., flyovers, bridges with barriers, indoor-outdoor noise.

Predictor gets imperfect data into shape quickly and automatically with advanced geometrical post-processing and macros while, with the unique unlimited undo/redo functionality, modelling is faster as you avoid tricky repairs of mistakes. Once modeled, get results quickly with Predictor's fast calculations, without the need to purchase large numbers of licenses or computers. Powerful result analysis enables you to check the model and identify the main sources. Avoid tedious bookkeeping with automated data and result management using model versioning. In addition, real-life measured data from a noise monitoring system or a sound level meter, for example, Type 2250, can be used as input for source emission and for checking results. Predictor matches modern IT-hardware with dual core support as default and is cost-efficient as one license allows modelling on several linked PCs.

Different configurations are optimised for different applications, enabling Predictor to be used for all applications ranging from small-scale impact assessments to mapping of large agglomerations.

Uses and Features

Uses

- Environmental noise mapping, management, action planning and impact assessment
- Educational purposes

Features

- Compliance with a range of national and international calculation standards
- Fulfilment of European Commission directives such as Environmental Noise Directive (2002/49/EC) in accordance with Guidelines on Revised Interim Computation Methods (2003/613/EC) and the European Commission's Assessment of Exposure to Noise Working Group's Good Practice Guide
- Fulfilment of the IPPC Directive (96/61/EEC)
- Intuitive, powerful and modern
- Fast learning curve, even for infrequent use
- Easy model comparisons with unique multi-model view
- Accurate and intuitive modelling, also for complex situations, for example, fly-overs, bridges with barriers, indoor/outdoor noise
- Advanced and extendable geometrical post-processing using macros
- Quick repair of mistakes with unlimited undo functionality
- Fast calculations, among the fastest on the market
- Time saving integrated bookkeeping for model data and results
- Powerful result analysis and what if scenarios
- Cost-efficient – one license allows modelling on several linked PCs

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Forth Energy

Grangemouth Renewable Energy Plant: Scoping Report *Addendum*

Forth Energy

Prepared by

Jones Lang LaSalle
and
Sinclair Knight Merz

March 2010

Contents

1 Addendum

1.1 Background

1.1.1 Forth Energy is seeking consent under Section 36 of the Electricity Act 1989 to construct and operate the 120 Megawatt (MW) Grangemouth Renewable Energy Plant (REP), on a site at the Port of Grangemouth. On 18 December 2009 Forth Energy submitted a Scoping Report in support of a request for a scoping opinion relating to the Environmental Impact Assessment (EIA) of the proposed development. The Scottish Government Energy Consents Unit (SGECU) issued this report to all statutory and non-statutory consultees on 24 February 2010, thereby commencing the formal scoping period. Consultees are invited to provide a response on the content and approach to the preparation of the EIA as documented in the Scoping Report.

1.1.2 The SGECU has set a deadline for responses to the scoping process as 18 March 2010.

1.2 Need for an Addendum

1.2.1 Since the submission of the scoping request for the Grangemouth REP, Forth Energy has continued to develop its plans for the site. This has led to the identification of a number of site-specific factors which have resulted in the need to refine the site boundary, to ensure the best operational flow of the proposed plant and equipment.

1.2.2 The amendment to the site boundary does not result in any change to the description of the proposed development that the scoping request relates to.

1.2.3 This addendum to the scoping report identifies the revised site boundary (Figure 2 (Rev A) included at Appendix 1), and details consequent changes to the proposed approach to the EIA. This addendum is to be read in conjunction with the original Scoping Report dated December 2009. Figure 2 (Rev A) in Appendix 1 of this Addendum supersedes and replaces Figure 2 in that report.

1.3 Updated Site Description

1.3.1 The revised site is in the same broad locality as that originally proposed in the Scoping Report, and encompasses a significant amount of the original area. The revised boundary provides a more regular shaped site within which to accommodate the proposed REP and avoids the requirement to realign the Central Dock Road.

1.3.2 The revised site is located in an area adjacent to Carron Dock and the Western Channel, utilising an area of 10.34 ha, wholly located within the operational boundary of Grangemouth Docks. The site is bounded to the north by the Central Dock Road, to the south by the dock railway spur and an area of scrub grassland, and to the east and west by existing port facilities including storage buildings and areas of hardstanding. The site includes an area extending eastwards along the southern edge of the Western Channel towards 'The Tongue' of Grange Dock. This area is proposed to incorporate the alignment of a conveyor to transfer fuel from the quayside to the proposed REP. The revised site no longer includes the East Quay area to the east of the site.

1.3.3 The site comprises a mix of scrub grassland and existing port facilities including storage buildings, areas of hardstanding and areas for the stockpiling of materials.

1.3.4 Figure 2 (Rev A) also illustrates two indicative potential 'areas of search' extending into the Firth of Forth which are included to accommodate cooling water pipe infrastructure to serve the REP. Only one set of cooling water pipes will be required for the operation of the plant, however the most appropriate location can only be selected as a consequence of the EIA process. The first of these areas extends to the north of the site and across the outflow of the River Carron and into

the Firth of Forth. The second extends to the east of the site along the alignment of the Grange Burn and into the Firth of Forth adjacent to the main sea lock entrance into the docks. The combined area of these two areas of search extends to 149.16 ha. The EIA process will consider and report on the detailed location of the cooling pipes.

1.4 Implications of Site Boundary Change

1.4.1 Forth Energy's consultant team has reviewed the implications of the revised site boundary on the approach to the Environmental Impact Assessment of the proposed development. This has included a review of potential environmental effects, and the methodology to assess identified effects.

1.4.2 As a consequence of this review, the consultant team has confirmed that the revised site boundary will not result in any change to the content of the Scoping Report, or the proposed approach to the preparation of the EIA.

1.5 Consultation and Next Steps

1.5.1 The revised site boundary, as documented in this Addendum is submitted to the SGECU, and in tandem with this is being circulated to all statutory and non-statutory consultees.

1.5.2 The SGECU has also modified its list of consultees since the request for a scoping opinion was submitted, identifying a number of additional non-statutory consultees to be included in the circulation of the request for a scoping opinion. Those consulted originally are identified in table 1.2 on page 7 of the Scoping Report. The additional consultees are noted as follows:

- Clackmannanshire Council
- Friends of the Earth
- Greenpeace
- Scottish Wildlife Trust
- Scotways
- Sustainable Development Commission
- WWF Scotland
- COSLA
- Scottish Government Renewable Strategy and On-shore Renewables Division
- Scottish Government Waste and Pollution Reduction Division
- Scottish Government Water, Air, Soil and Flooding Division

1.5.3 Consultee responses should be directed in all instances, in writing, to the SGECU (with a copy also sent to Forth Energy) at the addresses below, by the deadline set by the SGECU of 18 March 2010.

The Energy Consents and Deployment Team Renewable Energy Division Scottish Government 4th Floor, 5 Atlantic Quay 150 Broomielaw Glasgow G2 8LU	Head of Planning Forth Energy 1 Prince of Wales Dock Edinburgh EH6 7DX

1.5.4 It should be noted that consultees' responses will not be treated as confidential unless confidentiality is explicitly requested in the consultee's response.

1.5.5 All responses will be duly considered and where appropriate, the scope of the EIA will be amended. The ES will present the outcomes of the scoping and consultation process and explain how comments were addressed.

Appendix 1 – Proposed Site Plan

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Grangemouth Renewable Energy Plant

Figure 2 (Rev A)

Proposed Site Boundary (Revised)

Legend

- Site Boundary
- Two Areas of Search for Required Cooling Water Infrastructure

0 100 200 300 400 500

Metres

N

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Figures

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Grangemouth Renewable Energy Plant

Figure 7.1

Alternative Sites

Site A
Distribution Centre

Site B
Areas Q&S

Site C
Junction Dock

Site D
Deep Water Berth
Terminal Area

Site E
Areas P&Q

Legend

Appplication Boundary

0 100 200 300 400 500
Metres

N

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