Alexandra Dock Renewable Energy Project

Environmental Scoping Report

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Author:	SKM Enviros and Pisces Consulting Ltd
Project manager:	Vicki Heron
Name of organisation:	RES UK & Ireland Ltd
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1. Introduction

1.1. Alexandra Dock Renewable Energy Project

1.1.1. RES UK & Ireland (RES) intends to develop and construct a renewable energy project with capacity to generate 150 MWe of electricity at the Port of Liverpool on the site of the now infilled former Hornby Dock, adjacent to the Alexandra Branch Dock No. 3 (hereafter referred to as the Site), with development of associated water cooling infrastructure extending into the Mersey Estuary and an inland grid connection to Bootle Grid Substation (referred to hereafter as the Project). In accordance with the Planning Act 2008 a Project of this type, having capacity of more than 50 MWe, is defined as a Nationally Significant Infrastructure Project (NSIP) and therefore RES intends to submit an application for a Development Consent Order (DCO) to the relevant Secretary of State (SoS)[1], and a recommendation relating to the application will be made by National Infrastructure Directorate (NID) within the Planning Inspectorate (PINS). This Environmental Scoping Report (ESR) forms a request for NID to provide its opinion, under Regulation 8(1) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended)[2] (hereafter referred to as the EIA Regulations), of the content of an Environmental Impact Assessment (EIA), which RES intends to undertake of the Project.

1.1.2. The Project will generate up to approximately 1,100 GWh of renewable electricity per year once operational, the equivalent to the annual electricity consumption of up to around 250,000[3] average British households.

1.1.3. The Project will burn biomass which will be procured from sustainable and recovered sources to generate renewable and low-carbon electricity for export to the national electricity grid via an underground cable that will connect to Bootle Grid Substation. There is also the potential to generate steam and heat for use in nearby industrial, commercial and residential heating systems where demand permits, and RES is actively investigating this potential. It is currently intended that the Project will use once-through water cooling to cool the water used in the steam cycle for the Project, with the cooling water taken from and discharged to the adjacent Mersey Estuary.

1.1.4. Biomass will be delivered for use by the Project primarily by ship with a proportion coming by road. The exact proportion will vary in response to operational requirements, but the total is expected to be in the order of 1,200,000 tonnes per annum (tpa)[4]. A relatively small quantity of ash residue will be produced by the Project, and this will transferred off-site by either ship or road to be taken to a facility licensed to receive waste of this type.

1.1.5. The infilled Hornby Dock adjacent to Alexandra Branch Dock No. 3 at the Port of Liverpool is an ideal location for a biomass-fired renewable energy project. It has sufficient space for storing the biomass fuel, good shipping access and is designated in local planning policy for port related development. All fuel will be stored undercover within newly constructed fuel storage buildings. The development will also comprise a boiler house, stack, and other associated plant such as steam turbine, generator set, conveyors for transporting biomass fuel within the Site, and a once-through water cooling system linking the Project to the Mersey Estuary.

1.2. Consenting Regime

1.2.1. As the Project will have a generating capacity of up to 150 MWe, it qualifies as an NSIP[5], and will therefore require a DCO under Section 31 of the Planning Act 2008.

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1 The Secretary of State for Communities and Local Government is responsible for processes undertaken during the course of a DCO application (including for example the issue of a scoping opinion), but the Secretary of State for Energy and Climate Change would be responsible for the decision in respect of the application.

2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 SI 2009/2263 and as amended by SI 2011/2741.

3 Based on an average electricity consumption of 4,370 kWh per household in Great Britain per year (sub-national electricity consumption statistics: 2010, published March 2012, Department of Energy and Climate Change) and availability of the plant assumed to be 85% (Review of generation costs and deployment potential of renewable electricity technologies in the UK, Arup, 2011 (ARUP))

4 Assumptions for this calculation: 150MWe; 85% availability (ARUP); conversion efficiency of 37%; and average fuel calorific value (CV) of 2.4MWh/te. This CV represents an average of 80% wet wood chip and 20% recovered wood chip.

5 Above the 50 MW threshold for power stations

1.2.2. Following the abolishment of the Infrastructure Planning Commission (IPC) on the 1st April 2012 under the Localism Act 2011[6] applications for development consent for NSIPs will be submitted to the PINS' NID. PINS role will be to consider and make recommendations to the relevant SoS who will determine the application. The SoS for Communities and Local Government (CLG) is responsible for processes undertaken during the course of a DCO application (including for example the issue of a scoping opinion), but in this instance the SoS for Energy and Climate Change (ECC) would be responsible for the decision in respect of the application.

1.2.3. In support of the application an EIA will be undertaken of which this ESR forms part. Other documents in addition to this ESR will also support the DCO application, including:

- Regulation 6 Notification;
- Section 46 Notification;
- Statement of Community Consultation (SoCC);
- Consultation Strategy;
- Consultation Report;
- Explanatory Memorandum – this will address the agreed provisions or conditions that will apply to the Project;
- Book of Reference – this outlines those with a land interest and affected persons but is only required in the event of a Compulsory Purchase Order (CPO) being used;
- Environmental Statement (ES);
- Flood Risk Assessment (FRA);
- Statement of matters covered by the Environmental Protection Act 1990 Section 79(1);
- Sustainability Statement; and
- various plans of the Site and the proposed development: to include the application area, land boundary, proposed layout, section and elevations.

1.2.4. A DCO can grant deemed planning permission and consent under Section 36 and 37 of the Electricity Act 1989. It is therefore possible to apply for the power generating station and the Grid Connection Route (GCR) within the DCO.

1.2.5. The application for the DCO is to be guided by National Policy Statements (NPS) which have been prepared pursuant to Section 5 of the Planning Act. The NPS documents outline national policy with regards to key strategic planning topics, including energy policy, and aim to provide certainty regarding the long-term policy environment. Although the Localism Act 2011 paves the way for the abolition of the IPC, it also confirms that NPSs will be retained albeit that they will be subject to additional Parliamentary scrutiny before they can be designated an NPS. Therefore they will continue to act as primary documents in the examination of applications for development consent by the PINS.

1.2.6. Department for Energy and Climate Change (DECC) published a Draft Overarching NPS for Energy: A Framework Document for Planning Decisions on NSIP (EN-1) and a Draft NPS for Renewable Energy Infrastructure (EN-3) in November 2009, which are the relevant statements to this application. Both EN-1 and EN-3 were published as drafts for consultation, and as a result of this consultation amendments were made to the draft NPSs. Revised versions of these documents were released in October 2010 for public consultation, which ended on 24th January 2011. On 19th July 2011, NPS EN-1 and EN-3, alongside the other 4 NPSs for energy infrastructure, were designated as NPSs under the Planning Act 2008.

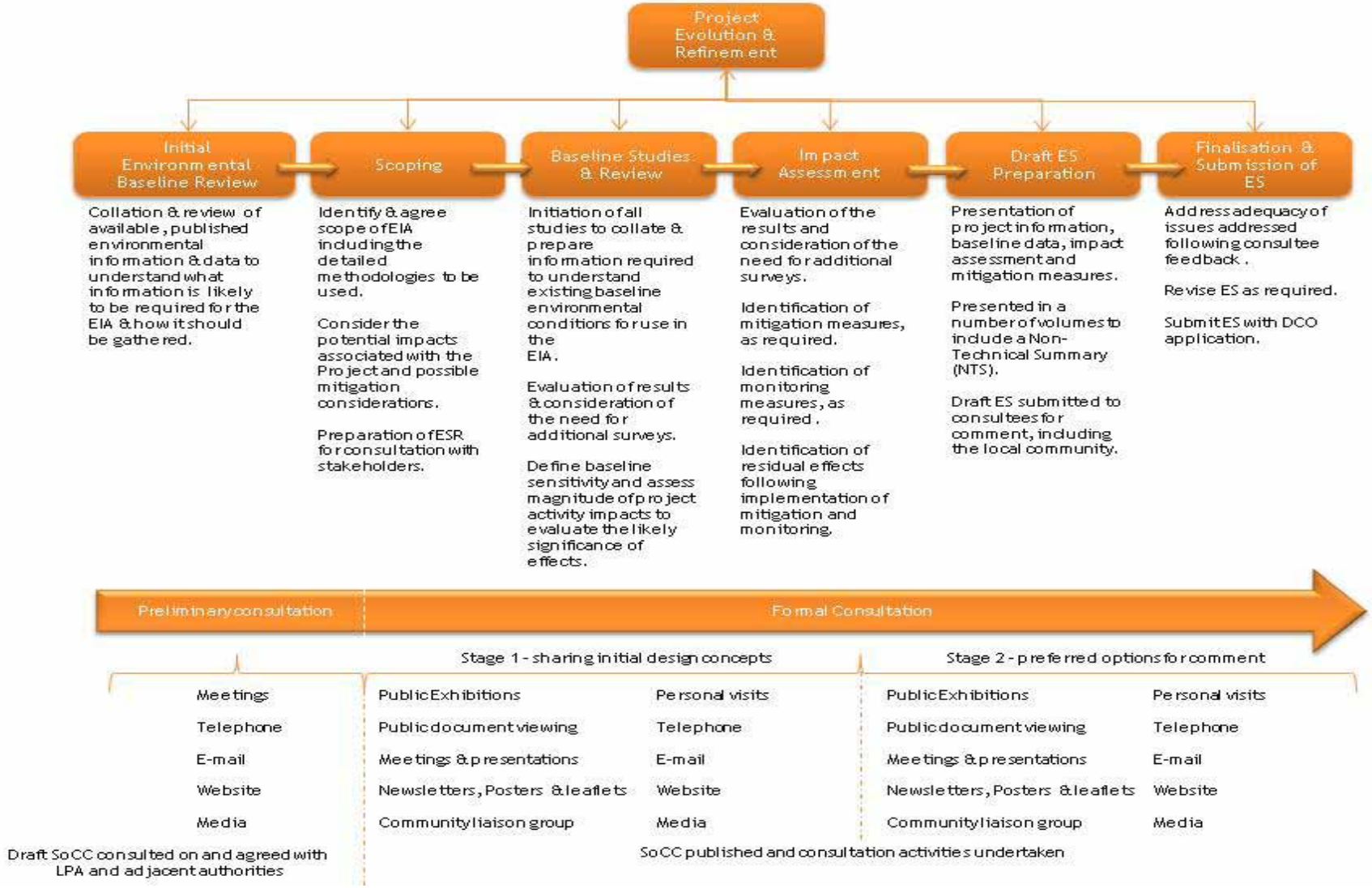
1.2.7. These NPSs provide the primary basis upon which the PINS will assess applications for renewable energy projects of this type.

[6] Localism Act 2011, Chapter 20, Published 15th November 2011, TSO.

1.3. EIA Process

1.3.1. EIA is a process conducted so that the likely impacts of a proposed development are identified and assessed before a decision is made on whether the Project is granted permission, as outlined in the EIA Regulations. This approach allows for the most environmentally favourable project design options to be identified at an early stage allowing the Project to be modified where possible to avoid or minimise significant environmental effects. The key steps employed as part of an EIA are illustrated in Diagram 1 and reflect the staged approach being undertaken for this Project. The process depicted in Diagram 1 is iterative, which means that many of the steps may need to be revisited in the event that new environmental information is discovered at a later step. Consultation, in particular, is an ongoing activity throughout the process. Responses from consultation are fed into the Project design and mitigation measures.

Diagram 1: EIA Process



1.4. Stakeholder Consultation

1.4.1. The benefits associated with timely and comprehensive stakeholder consultations are fully recognised by RES. Consultation is an important component of the EIA process, allowing interested and affected parties and organisations to become involved in the planning and development process of the Project, and to ensure that their concerns, ideas and hopes for the Project are considered.

1.4.2. A significant part of the DCO application is the requirement to consult with statutory or prescribed consultees and those with a land interest as described under Section 42 and 44 of the Planning Act 2008 respectively. Additionally, Section 47 of the Planning Act 2008 also requires RES to consult with the local community (described further in Section 1.6 of this ESR) while Section 49 of the Planning Act 2008 stipulates that RES has a duty to have regard to responses to consultation. The output from consultation under Section 42, 44 and 47 of the Planning Act 2008 will be captured in the form of a Consultation Report, which, as previously highlighted, will be submitted with the DCO application.

1.4.3. RES will submit a Regulation 6 Notification under Regulation 6(1) of the EIA Regulations informing the PINS that it intends to undertake an EIA and submit an ES for the Project. The PINS will return a list of consultees, under Regulation 9 of the EIA Regulations, with whom RES must consult as part of Section 42 consultation (Prescribed Consultees). Before formal consultation can start, it is a requirement of Section 46 of the Planning Act 2008, for RES to notify the PINS of its intention to commence formal consultation, and in so doing provide adequate information on which it intends to commence that consultation.

1.4.4. RES has begun preliminary consultation with a number of Prescribed Consultees. The preliminary consultation undertaken to date by RES and the Project team has included meetings with Sefton Metropolitan Borough Council (Sefton MBC), the Environment Agency (EA), Natural England (NE), Mersey Docks & Harbour Company (MDHC), Port of Liverpool and the Marine Management Organisation (MMO). A number of pre-scoping consultation meetings have been held with Sefton MBC, as well as with adjacent authorities, Wirral Borough Council (Wirral BC) and Liverpool City Council (Liverpool CC), the EA, NE, MMO and Merseyside Environmental Advisory Service (MEAS). The advice obtained to date has been incorporated into this ESR. Consultation will be ongoing with these organisations on a range of environmental issues as part of the EIA and formal consultation.

1.4.5. The PINS and consultees are invited to comment on the possible significant environmental effects of the proposal development, the proposed methodologies to assess the impacts and the ES structure, as presented within this ESR.

1.4.6. The PINS and consultees are also invited to highlight any additional issues that they believe should be addressed within the EIA, and to identify any sources of information, which may be of interest to RES and the EIA team.

1.4.7. Consultee responses should be directed in all instances, in writing, to the PINS, with a copy also sent to RES, at the addresses below:

Ms Frances Russell Infrastructure Planning Commission Temple Quay House Temple Quay Bristol BS1 6PN	RES C/O SKM Enviros Ms Vicki Heron Project Manager Alexandra Dock REP EIA SKM Enviros 4th Floor, Metro 33 Trafford Road Salford Quays Manchester M5 3NN

1.4.8. It should be noted that consultee responses will not be treated as confidential unless explicitly stated as so in the consultees' response.

1.5. Community Consultation

1.5.1. A consultation programme with the local community will be instigated during the EIA fulfilling the requirements of Section 47 of the Planning Act 2008. Further details of the proposed local community consultation to be undertaken by RES are provided in the SoCC and its supporting Consultation Strategy. The SoCC outlines how RES intends to consult with the local community. RES has requested comment and approval of the draft SoCC from Sefton MBC and adjacent 'A' authorities[7] including Liverpool CC, Wirral BC, West Lancashire Borough Council (West Lancs BC) and Knowsley Council. Following this, the final SoCC will be published in local newspapers and on the National Infrastructure Planning website. It will detail how RES intends to consult with the local community on the Project and how it will make Preliminary Environmental Information (PEI) available for review. RES will also publish the SoCC on the Project website www.alexandradockproject.co.uk. This process will allow the local community the opportunity to comment on the proposals and for RES to take these on board during the development of the design.

1.6. Purpose of this Environmental Scoping Report (ESR)

1.6.1. RES is submitting this ESR to the PINS and the SoS for CLG to support its request for an opinion on the scope of the EIA pursuant to Section 8(1) of the EIA Regulations. Following receipt of the Scoping Opinion from the SoS for CLG, RES will undertake an EIA and produce an ES to accompany the application for the DCO and other application documents.

1.6.2. The Regulations set out the requirements for an applicant who proposes to request a scoping opinion from the SoS for CLG. Regulation 8 Paragraph 3 s requires a request for a scoping opinion to include:

- a description of the proposed Project;
- the methodology to be adopted in the EIA; and,
- the possible effects of the proposals, including those that are potentially significant, as well as those not considered to be significant and which can, therefore, be scoped out of the EIA.
- These requirements are set out in this report. The Regulation 8 Notification will be submitted to the PINS and SoS for CLG with the Regulation 6 Notification.

1.6.3. This ESR presents a preliminary assessment of issues considered to be significant, to enable resources to be focused only on the necessary investigations. The EIA will consider the various phases of the proposed development including:

- demolition and construction: impacts may arise from demolition and construction activities on the site of the proposed power plant (power plant defined in Section 4). Typically the effects are short term;
- operation: impacts result from land take and the operation of the Project. Any effects generally last for the life of the Project; and,
- decommissioning: there will be short term impacts associated with the removal of operational features, while the longer term impacts of decommissioning are considered to be small.

1.6.4. This ESR will enable the PINS and consultees to formally comment on the environmental issues that have been identified and the methodologies proposed to assess potentially significant impacts from the Project. It will also provide an opportunity for the PINS and consultees to highlight any additional issues that they believe should be addressed within the EIA.

[7] As defined in Advice Note 3 (Version 2, July 2011) of the EIA Regulations. Local authorities are identified under s.43(3) of the Planning Act as either 'A' or 'B' local authorities. A 'B' authority is the authority(s) in which the proposed application is located, which includes the development integral to the NSIP and any associated development. An 'A' authority is an authority that shares a boundary with the 'B' authority.

1.7. Preliminary Environmental Information

1.7.1. Pursuant to Section 10(b) of the EIA Regulations, PEI must be made available for consultation under Section 47 of the Planning Act 2008. Details of how this will be made available to Section 47 consultees will be included in the SoCC. RES is submitting the first part of its PEI as a separate document alongside this ESR to the PINS.

1.7.2. The PEI indicates the key items of environmental information and issues that will be addressed. In summary, the PEI outlines the following by each environmental topic:

- baseline description summary;
- proposed approach and surveys to be undertaken;
- initial outcomes; and,
- further environmental information to be provided to Section 47 consultees during the Pre-Application stage.

1.7.3. Further information to satisfy the requirements of providing PEI to Section 47 consultees will be made available throughout the pre-application stage as it becomes available, the details of which are to be included in the SoCC. Details of how RES intends to consult on PEI will be given with the SoCC which will be published online at www.alexandradockproject.co.uk and on the National Infrastructure Planning website. The SoCC will also be made available in print form when published at the following locations:

- Floral Pavilion, Wallesey, CH45 2JS;
- Eldonian Community Housing Office, Liverpool, L3 6LG;
- Merseyside Third Sector Technology Centre, Waterloo, Liverpool, L22 0NY;
- Sefton Investment Centre, Bootle, L20 3EF;
- Litherland Library, Liverpool, L21 6NR;
- Spellow Community Library, Walton, Liverpool, L4 3XF;
- Orrell Park Community Centre, Liverpool, L9 8AJ; and,
- Netherton Park Community Centre, Bootle, L30 1QW.

1.8. RES UK & Ireland Ltd

1.8.1. RES is one of the world's leading independent renewable energy project developers with operations across Europe, North America and Asia-Pacific. RES has been at the forefront of wind energy development since the 1970s and has developed and/or built more than 5,000 MWe of renewable energy capacity worldwide, including projects in the United Kingdom (UK), Ireland, France, Scandinavia, and the United States of America (USA), with a large additional portfolio in development.

1.8.2. RES is active in a range of renewable energy technologies for heat and power generation including biomass, wind, solar and marine. RES is currently developing two dedicated biomass projects in the UK, of which the Project is one. Drawing on 25 years' experience in renewable energy development and strong track record in project delivery, RES brings its considerable engineering, technical, environmental and business development expertise to a sector with huge potential for low-carbon power generation and job creation. RES's pioneering 'low-carbon' headquarters in Kings Langley, Hertfordshire, embodies the company's commitment to sustainability and the principles on which its business is based. RES was recognised as one of the top 30 green UK companies in the Sunday Times 2010 Green List.

2. Site Selection

2.1. Introduction

2.1.1. The Site is located within the operational Port of Liverpool on the now infilled former Hornby Dock adjacent to the Alexandra Branch Dock No. 3. The location of the Site and the components which make up the Project are presented on Figure 1 and Figure 1a, the Site Location Plan and the Zoned Project Areas.

2.1.2. This section briefly presents RES's rationale for selecting the former infilled Hornby Dock and Alexandra Branch Dock No. 3 as the Site, and outlines the preliminary planning and assessment work undertaken to date to inform the decision regarding the 150 MWe capacity for the Project. A more comprehensive section on site selection will be presented in the ES.

2.2. Selection of the Former Infilled Hornby Dock and Alexandra Branch Dock No. 3

2.2.1. The Project will require up to 1,200,000 tpa of biomass fuel to operate. While biomass fuel resources exist in the UK they are limited and RES expects to import a significant portion of the total fuel required. RES expects approximately 80% of the biomass fuel to come to the Site by ship (whether sourced domestically or abroad) and the remaining 20% by road. Transporting biomass in bulk by ship provides economies of scale on both economic and carbon terms. Therefore shipping access, particularly deep water shipping access, was a fundamental requirement in the site selection process and is central to the Project's viability.

2.2.2. Given its deep water shipping access, the Port of Liverpool was identified by RES as a potentially suitable location for a renewable energy project using biomass as its fuel. Working with the Port of Liverpool, the Site adjacent to Alexandra Branch Dock no 3 was identified. RES then undertook a number of feasibility studies to optimise the Project size given the land area available and the local environment.

2.2.3. The Site has been selected as a suitable location for a biomass development due to being located within a Port that has a docking area capable of taking ships of the necessary size to receive deliveries of fuel from the UK and abroad. In addition, the Site is located within a Priority Area of the Linacre ward, as designated by Sefton MBC, for providing and sustaining employment opportunities[8]. The availability of a sufficiently large area of land, a supply of cooling water and a nearby electrical connection were also factors in the Site's selection. The wider industrial area may also include potential consumers for steam and/or heat from the generation process.

2.2.4. The ES will provide a description of why the Site was selected and alternative design considerations investigated. A summary of the key factors which influenced the selection of this location were as follows:

- Alexandra Branch Dock No. 3 provides a sufficiently large docking area for ship deliveries, accessed from the Mersey Estuary via the Langton Lock. The dock is a dedicated berthing for panamax vessels needed for the delivery of biomass fuel;
- the infilled former Hornby Dock is immediately adjacent to Alexandra Branch Dock No. 3 and provides the land area that would be required to construct the Project with generation of up to 150 MWe. In addition, the fuel reception equipment and storage buildings will be constructed on the land directly adjacent to the dockside in Alexandra Branch Dock No. 3, therefore biomass material would be transferred directly into the storage buildings once offloaded from the ships;
- the Site has good road links through the use of the existing road network within the Port of Liverpool docks and the wider public road network, as well as links to the Manchester Ship Canal which provides additional, unique opportunities to transport biomass by water; and
- Bootle Grid Substation is approximately 2.5 kilometres (km) from the Site, which will allow an underground cable to be laid to connect the Site to the national electricity grid.

[8] Policy UP1 Development in Urban Priority Areas, Sefton Unitary Development Plan, June 2006.

2.2.5. The suitability of the Site and alternatives has been tested in a Project team design workshop. The design workshop aimed to identify any potential constraints, issues and opportunities relating to the Project so that these could be addressed at the earliest stage, consulted on with relevant consultees, and accounted for in the design of the Project. Actions from the workshop to test alternatives were as follows:

- initial air quality stack modelling to determine the most efficient stack height. This also led to a review of power plant capacity the results of which are outlined in Section 2.3; and
- cooling water infrastructure alternatives having regard for technical feasibility, costs and environmental constraints. The results of this are presented in Section 2.3.

2.2.6. The appropriateness of the location at Alexandra Branch Dock No. 3 and the now infilled former Hornby Dock for the Project was an integral part of the workshop considerations. As a result of this workshop and further follow-up work to monitor actions to address the outcomes, RES considers that the Site at the now infilled former Hornby Dock and Alexandra Branch Dock No. 3 is appropriate for this Project.

2.2.7. The ES will, however, provide further information on the selection of the former infilled Hornby Dock as a favoured site and the results of investigations into alternative layouts and designs for this Project.

2.3. Selection of 150 MWe capacity

2.3.1. RES considered a 100 MWe and a 150 MWe project size. To finalise the capacity of the Project a number of feasibility studies have been undertaken as outlined in paragraphs 2.3.2 to 2.3.16.

Land availability and layout

2.3.2. The buildings with the greatest footprint are the fuel storage buildings. Sizing the fuel storage buildings correctly is critical to the operational success of the Project. The storage buildings need to be big enough to store biomass fuel from the largest ships delivering biomass fuel to the Site and to allow for any potential disruptions to supply. A number of layout options and fuel storage configurations were considered and analysed. The results of the analysis showed that there is sufficient land available to build either size of project.

Commercial

2.3.3. Capital costs are one of the main cost items in the financial model of the Project. At 150 MWe the capital cost per MWe is lower than at 100 MWe. The 150 MWe Project also results in an increase in cycle efficiency, reducing costs and improving performance. Therefore, the 150 MWe Project model yields a more robust and commercially sustainable Project. The 150MWe Project will also yield added local benefit in terms of employment, in the port and along the supply chain and from the community fund and business rates payable to the local council.

Preliminary air quality impact assessment

2.3.4. This assessment compared the impact of a 100 MWe Project and a 150 MWe Project at this location at Alexandra Dock on local air quality. The goal of this study was to determine a suitable stack height and to understand and compare the potential impact of either size Project. The assessment focused on the maximum predicted concentrations at any off-site location on-land and also the predicted concentrations at the Sefton MBC air quality management areas (AQMAs). The results of the assessment were used to assess if either size project would have a defining impact on what size the Project should be. The results of the preliminary air quality impact assessment show that neither option will result in a significant impact on local air quality. Therefore, air quality was discounted as a deciding factor in selecting whether to proceed with a 100 MWe Project or a 150 MWe Project. The results can be found in Appendix A and are summarised in Section 6.2 of the ESR.

Preliminary traffic and transport scoping assessment

2.3.5. A preliminary traffic and transport scoping assessment was completed and consulted on with Sefton MBC. The results of the preliminary traffic impact assessment show that the impact from operational traffic associated with the 150 MWe Project would be negligible in the context of existing traffic movements. The preliminary assessment and consultation identified that demolition and construction traffic movements would have an impact and that mitigation should be proposed and agreed via a Construction Management Plan. The preliminary assessment and record of preliminary consultation undertaken with Sefton MBC, the Highways Agency and Liverpool CC is presented in Appendix B. As a result of the preliminary assessment and preliminary consultation, traffic impact was discounted as a deciding factor.

Grid availability

2.3.6. RES commissioned a feasibility study from SP Manweb about the viability of connecting 100 MWe or 150 MWe of generation to the local electricity network. The study confirmed that there is sufficient capacity within the network to connect either size of Project.

Cooling system

2.3.7. The three alternative cooling systems available for this Project include air cooled condensers, once-through water cooling, and a hybrid cooling system.

2.3.8. Air cooled condensers work on the basis of evaporative cooling using mechanical draught cooling structures. This method markedly reduces efficiency, thereby increasing fuel consumption and the emission of exhaust gases for each unit of electricity produced. An air cooled condensing system requires no water intake and results in no visible plume, yet is the least efficient of the three technologies available for the Project. The advantage of this method is that it avoids any potential issues associated with water cooled systems (water abstraction, treatment, discharge and potential contamination of the steam water circuit). However, the disadvantage is a comparatively lower thermal efficiency particularly during the summer months. Air cooled condensers are also noisier than a 'once-through' system, requiring fans to draw air into the system for cooling, which is an important consideration due to the proximity of residential areas approximately 400 metres (m) from the Site.

2.3.9. Once-through water cooling consists of a high efficiency water-cooled condenser and a once-through cooling water system. It is the most energy efficient of the cooling technologies available for a Project such as this and is generally considered by the EA to represent Best Available Techniques (BAT). This method would require the abstraction of water from an accessible water source and the discharge of water at a temperature of up to 10 degrees centigrade (^{o}C) warmer than ambient water temperature.

2.3.10. A hybrid cooling system requires low plume cooling structures, which require significantly lower volumes of cooling water than a once-through system. An intake and outfall would need to be provided, and the discharge would typically be around 4 ^{o}C warmer than ambient water temperature. However, such a system has a lower overall efficiency than a once-through system, and the hybrid nature of the cooling structure results in a water vapour plume being visible under certain climatic conditions.

2.3.11. A summary of the considerations made for the operational BAT for each cooling option is presented in Table 1.

2.3.12. This information contributed heavily to the decision to currently favour the once-through water cooling method. This information formed part of a presentation that was made to consultees including EA, MMO, MEAS, NE, and Sefton MBC, in January 2012 as part of preliminary consultation activities (outlined in paragraph 1.4.4). Comments that have been received following this presentation have been addressed in Section 6 of the ESR.

Table 1: Operational BAT Justification for selection of cooling technology

Impact	Air Cooled Condenser	Hybrid Cooling System	Once-Through Water Cooling
Water usage	No water required for cooling.	Lower water consumption than once-through cooling as water is recirculated, with consumption limited to make-up water added to compensate for evaporative losses and blowdown. Possible small-scale entrainment of fish.	Large volume but all returned to source. Potential impingement and entrainment on marine life.
Water discharge	N/A - No requirements.	Discharge to Mersey Estuary. Some discharge of residual biocide (chlorine compounds) and concentrated salts to the estuary.	Discharge to Mersey Estuary, potential impact on marine environment as a direct result of the increased temperature of the discharge water and discharge of biocide (chlorine compounds).
Energy efficiency	Least efficient of the three potential technologies, as heat transfer is much less efficient.	Higher energy consumption than once-through cooling, leading to lower overall efficiency, but still substantially better than air cooling. Higher energy consumption results from recirculation of the cooling water and use of fans which draw air through the cooling tower.	Most efficient option in relation to the high thermal efficiency that can be achieved. From the energy standpoint once-through cooling is by far the most economical solution.
Air emissions	Emission of exhaust gases for each unit of electricity produced is higher and ambient air temperature is increased. Increased CO_2 emissions.	Slightly higher total heat emissions to atmosphere. Potential issues with ground-level salt deposition and contributions to atmospheric particulate levels.	No emissions to air.
Global warming potential	Emission of exhaust gases for each unit of electricity produced and CO_2 emissions increased.	Increased CO_2 emissions, compared to once-through cooling.	Lowest CO_2 emission per unit of electricity generated for all potential options proposed.
Waste	None.	Minimal waste from inlet screens and disposal of sludge generated in towers.	Minimal waste from inlet screens.
Noise	Requires noise abatement measures.	Requires noise abatement measures.	Low to negligible.
Visual	No visible plume but construction of significant structure will increase visual impact and footprint of scheme as a whole.	Visible plume which may reduce aesthetics or might impair visibility or cause icing on nearby roadways. Structures will increase visual impact of scheme as a whole.	No visible plume. Minimum on-site infrastructure and smallest footprint.
Capital cost	Lowest capital cost option.	Slightly higher capital cost compared to air cooling solution.	Higher capital cost compared to air cooling given site-specific drilling requirements for outfall and intake structures. Higher capital cost is recovered relatively quickly due to enhanced Project performance.

Impact	Air Cooled Condenser	Hybrid Cooling System	Once-Through Water Cooling
Maintenance costs	Low maintenance costs but overall high operational cost as a result of the greater cost associated with energy generation and additional land take. Potential for increased maintenance cost given presence of open coal storage at adjacent site.	High operational costs when compared to once-through cooling, as a result of lower overall efficiency. Costs will also be incurred for waste disposal (debris from the intake screens and sludge from towers) and additional land take.	Maintenance costs are lower with this option as there is less to maintain. Reduced land take for on-site infrastructure.
BAT	Not considered to be BAT.	Considered to be BAT only where water is in extreme short supply, but should be assessed on a case by case basis.	Considered to be BAT providing that: (1) fish can still migrate through the extended heat plume in the receiving water; (2) the cooling water intake minimises fish entrainment; and (3) heat load does not interfere with other users of the receiving surface water.

2.3.13. A once-through water cooling method requires the construction of an intake and outfall structure. The four options considered in the preliminary assessment undertaken by RES include:

- intake and outfall located in the Estuary;
- intake located in the walls of the dock and outfall into the Estuary;
- intake located in the Estuary and outfall into the dock; and
- intake and outfall within the walls of the dock.

2.3.14. The selection of the most appropriate method and intake/outfall position has been proposed based on environmental and commercial factors. It is proposed that the intake water will be taken from, and the outfall discharged to, the Mersey Estuary. The reasons are for this are as follows:

- technical / engineering aspects:
- avoids water discharge affecting intake;
- attracts the least sediment load;
- treatment requirements lower; and
- minimal disruption to dock infrastructure (including walls and vessels);
- environmental aspects:
- no clear environmental reason for excluding it as an option at this stage of investigations; and
- no option has a clearly lower degree of potential impact to warrant promoting over another option.

2.3.15. It was decided to opt for locating the intake and outfall in the Mersey Estuary largely on technical grounds, but with appraisal of environmental impact to be undertaken to confirm this is the most appropriate method.A preliminary dispersion modelling assessment has been undertaken to inform decisions on the likely siting of locations for the intake and outfall in the Mersey Estuary. The results of this modelling will be used to inform the impact assessment and in conjunction with consultation with consultees, such as the EA and MMO. At present, the area considered for the likely positioning of the intake and outfall structures is indicated within the Indicative Red Line Boundary on Figure 1 and Figure 1a as the 'Area of Search for Water Cooling Infrastructure'.

2.3.16. A number of potential land based and river based installation techniques are available for installing the water cooling pipes. The preferred solution known as Horizontal Directional Drilling (HDD) enables pipes to be installed without the need for trenching, avoiding the environmental impacts associated with excavating a trench and minimising interference with the dock and other Port infrastructure. The operation typically involves an onshore rig drilling to a depth of approximately 40 m before levelling out and re-surfacing in the area marked as 'Area of Search for Water Cooling Infrastructure' shown in Figure 1a. Once the drill holes have been prepared a permanent pipe structure is pulled back through the hole. The permanent pipe is usually installed in as few sections as possible in order to minimise defects and delays in assembly. For indicative purposes, if the longest pipe is installed in one single section, it could extend to approximately 1 km. In order to achieve this, individual pipe sections are preassembled and laid out on land or floated in the river prior to being pulled into the drill hole. In the case of pipes floated in the river ('float and flood technique') the completed pipe sections would be manoeuvred into position using barges and lowered by flooding as they approach the underwater inlet/outlet structure. As the float and flood process minimises contact with the estuary floor, the impacts on the local environment are minimal.

Renewable energy benefits

2.3.17. The 150MWe Project will have a greater generating capacity than the 100 MWe project model. The 150MWe Project will, from the same land area, provide a greater contribution towards achieving local, regional and national renewable energy, carbon reduction and energy diversity and security targets.

Conclusion

2.3.18. Given the benefits of the 150 MWe Project and lack of any significant environmental impact of it relative to the 100 MWe Project model, it was decided that the 150 MWe Project model with water cooling was the best use of the land area available.

3. The Site and Surroundings

3.1. Site Location and Description

3.1.1. The Project's main development area is located within the operational Port of Liverpool docks on the now infilled former Hornby Dock adjacent to the Alexandra Branch Dock No. 3. The location of the Project forming the application area is defined by an Indicative Red Line Boundary which is presented on Figure 1. The total area covered within the red line boundary is 69.1 hectares (ha). The Project comprises three components which include the Power Island, the Grid Connection Route, and the Area of Search for Water Cooling Infrastructure. These three areas are shown distinctly in Figure 1a. Each project component is outlined as follows:

- Power Island: The proposed power plant area (referred to hereafter as the Power Island), which will include the combustion and power generation equipment, and the fuel reception and storage area is located on the now infilled former Hornby Dock and comprises approximately 10.5 ha of dockside brownfield land;
- Grid Connection Route: There will be an underground cable to connect the Power Island to the national grid, which will extend east from the Power Island to Bootle Grid Substation which is approximately 2.5 km away. This area comprises approximately 5.1 ha; and,
- Area of Search for Water Cooling Infrastructure: At the current time an 'Area of Search' is included within the Indicative Red Line Boundary. This area comprises approximately 52.6 ha and will be refined during the course of the EIA and is currently marked with red hatching on Figure 1 to reflect this (referred to hereafter as the Area of Search for Water Cooling Infrastructure). The water cooling infrastructure will be located within this area and will have a much smaller footprint. The PINS and consultees are requested to provide initial comments to help aid this area refinement.

3.1.2. These areas are illustrated in total by the Indicative Red line Boundary on Figure 1 and distinctly in Figure 1a.

3.1.3. The Site forms the principal development area for the Project and is shown in Figure 1a, outlined in red. The Site lies approximately 1 km to the west of Bootle town centre and 3 km north of Liverpool city centre, approximately 4.5 km east of Wallasey and 7 km north east of Birkenhead (across the Mersey Estuary as the crow flies), and 25 km south of Southport.

3.1.4. The Site is bound by the internal dock road to the east, a coal terminal to the north, a lock giving access to Gladstone Dock to the west and the Alexandra Branch Dock No. 3 to the south.

3.1.5. The Port of Liverpool docks are managed by MDHC. The land on which the Site itself is located is owned by MDHC a subsidiary of Peel Ports Ltd and is situated within the Linacre ward, which is within the administrative boundary of Sefton MBC. The area of the Indicative Red Line Boundary that extends east in relation to the Grid Connection Route crosses over to the Derby ward which is also within the administrative boundary of Sefton MBC.

3.2. Site History and Existing Use

3.2.1. The Hornby Dock was infilled between 1992 and 1994 using available construction and excavation waste. After being infilled, the site was used to store coal. It is now brownfield land which is mainly used for parking of haulage and other transportation and warehousing storage. The existing use of Alexandra Branch Dock No. 3 is for the receipt of bulk products such as grain and timber, which are transferred for storage in existing warehouses within the Port of Liverpool.

3.2.2. There are some small vegetated areas within the Site boundary. At the time of the Phase 1 Habitat Map (Figure 5), small vegetated areas were located in the north east corner and the north western areas of the Site, however these are believed to have limited habitat potential. See Section 6.4 for more detail.

3.2.3. There is no running water within the Site, and the only standing water is due to pooling of rainwater in an area of settlement of surfaces in the north eastern part of the Site.

3.2.4. Further information on the Site, as well as the wider Indicative Red Line Boundary area is included in the baseline description provided for each of the specialist environmental assessments in Section 6. A detailed site description, including information relating to site history, will be presented in the ES, as well as supporting Geotechnical and Geo-Environmental Desk Study[9] which will be presented as an Appendix to the ES (hereafter, this will be referred to as the Desk Study).

3.3. Site Surroundings

3.3.1. The Site is within the existing Port of Liverpool. The Port of Liverpool comprises port operations to the north and south and east of the Site and extends for approximately 5 miles alongside the Mersey Estuary, with the Estuary situated to the west.

3.3.2. The immediate neighbouring dock activities include E.On's Gas fired Combined Heat and Power (CHP) facility to the east of the Site, a coal storage and unloading facility to the north of the Site, within the Gladstone Dock area, and a metals recovery facility to the south of the Site.

3.3.3. In addition, there are four wind turbines managed by Peel Energy located approximately 800 m south west of the Site along the dock wall between Alexandra Dock and Huskisson Dock. Further dock-related unloading and offloading from ships, the storage and haulage of goods and materials processing, including facilities operated by New Britain Palm Oils and Cargill, are located in the wider dock area surrounding the Site.

3.3.4. The main dock road runs along the north eastern boundary of the Site and the main railway infrastructure for the port runs parallel and adjacent to this further to the north east.

3.3.5. Industrial and business units are situated beyond the Site boundary and between Regent Road and Rimrose Road / Derby Road, which run parallel to each other and to the border of the dock complex running south east to North West in direction.

3.3.6. The closest residential dwellings are located 400 m due east of the Site.

3.3.7. The Site is approximately 15 km North West from John Lennon Airport, which is south of Liverpool city centre. It is noted that consideration will need to be given to flight paths and zones that could potentially be impacted by the Project.

3.3.8. The North Wirral Foreshore proposed Special Protected Area (pSPA) and proposed RAMSAR (pRAMSAR) is the closest internationally recognised environmental designation to the Site at 1.9 km to the west. The Mersey Narrows Site of Special Scientific Interest (SSSI) is the closest nationally designated site to the Site and is located approximately 1.8 km west. Those sites with statutory environmental designations within 2 km and 5 km of the Site are presented on Figure 4. Further details are also provided in Section 6.4.

[9] Geotechnical and Geo-Environmental Desk Study, Alexandra Dock, Liverpool. 27 September 2010. Final Report. Royal Haskoning.

4. Description of the Project

4.1. Project Overview

4.1.1. The Project will generate up to 150 MWe of renewable electricity from the use of approximately 1,200,000 tpa of biomass fuel (dependent upon calorific value). Other than during commissioning, start-ups and possible intermittent load support to the main boiler(s), no supplementary fossil fuel will be burned.

4.1.2. The Project is intended to operate as a base-load or continuous process except during maintenance periods.

4.1.3. The indicative Project infrastructure is shown on Figure 2. The Project includes three components: the Power Island, Grid Connection Route and an Area of Search for Cooling Water Infrastructure (as defined in para. 3.1.1 and shown in Figure 1a).

4.1.4. A schematic of the power generation process associated with the Project is provided below in Diagram 2. The main components of the Project shown in this schematic are described further in Section 4.

4.1.5. The Power Island will include the combustion and power generation equipment and is located on the now infilled Former Hornby Dock. The Fuel Reception and Storage Area is also located on the infilled Hornby Dock adjacent to the north quay of the Alexandra Branch Dock No 3. This area will house the fuel reception, unloading, screening and storage facilities. Once delivered into the reception system, fuel will be transferred to the fuel storage buildings and then on to the Power Island via an enclosed belt conveyor system. The Power Island and Fuel Reception and Storage Area layout (Layout) is shown in Figure 2a. This Layout is presented for indicative purposes at this stage to provide stakeholders with information on which to base the Scoping Opinion. Minor changes to this layout are expected to come about as a result of completion of the EIA, architectural design and consultation process. Specific items that could change are the arrangement of the flue gas equipment, location of the flue, substation and on-site water cooling infrastructure and arrangement of the fuel transport conveyors. The buildings shown represent a worst case scenario in terms of the building dimensions and may be reduced once the EIA, consultation and detailed design processes complete.

4.1.6. The Grid Connection Route extends approximately 2.5 km east from the Site to Bootle Grid Substation.

4.1.7. The once-through water cooling structures will be located within the Area of Search for Water Cooling Infrastructure that extends south west from the Power Island. This will include the installation of underground pipes for the intake of cooling water from, and outfall of discharge water to, the Mersey Estuary. The intake and outfall heads will be constructed on the river bed within the Area of Search for Water Cooling Infrastructure. The preliminary location of these structures is shown in Figure 2.

4.1.8. The demolition and construction phase for the Project will be approximately 39 months. It is expected that the demolition and construction workforce will peak at approximately 500 people. An operational workforce of about 45 is anticipated.

4.1.9. Access to the Site during demolition and construction will be facilitated either via the Main Port Gate at Seaforth or the Strand Gate. Access via the Main Port Gate will be available 24 hours a day, seven days a week. Access via the Strand Gate is limited to the period 0615 to 1915 hours, Monday to Friday.

4.1.10. The potential for the Project to increase its efficiency through the supply of steam and heat to nearby activities will be investigated thoroughly. The Project will be designed to include appropriate steam off-takes to enable steam or heat to be purchased in the future, should any future local users wish to contract for it.

4.1.11. Sections 4.2-4.11, describe each of the main components of the Project. Further details will be provided in the ES.

4.2. Fuel Type and Source

4.2.1. It is recognised that whilst local sources of biomass fuel exist, they are limited, so a significant proportion of the fuel will come from overseas or elsewhere in the UK and will be delivered by ship. Fuels are anticipated to comprise:

- imported, wood-derived, biomass fuel (wood chips, pellets and briquettes);
- recovered wood[10]; and
- UK-sourced forestry wood.

4.2.2. All fuel will comply with the requirements and definitions of biomass as defined in the Renewables Obligation Order[11]. The precise fuel specifications will be agreed with the EA as part of the Environmental Permit (EP) application that will be prepared and is anticipated to be submitted following submission of the DCO application.

4.2.3. It is anticipated that on average 80% of the fuel will be delivered to the Site via ship, and offloaded at the existing dock, before being transferred to the Fuel Reception and Storage Area, via an enclosed belt conveyor system. There will be approximately four shipments per month, depending upon the fuel's energy density. The remaining 20% of fuel will be delivered by road.

4.2.4. All fuels will be sustainable and compliant with the UK Government's sustainability criteria. In addition, it is RES's intention to include a Requirement in the draft DCO that states the Project will meet the relevant Government sustainability criteria for the lifetime of the Project.

4.2.5. Fuel will arrive at the Project in numerous physical shapes and sizes, including chips, pellets and briquettes.

4.3. Fuel Storage and Handling

4.3.1. The Project will require approximately 1,200,000 tpa of biomass depending on the moisture content and calorific value of the fuel.

4.3.2. Approximately 25 days of fuel will be stored within the Site to maximise operational flexibility.

4.3.3. Processed fuels will be stored in fuel storage sheds up to 30 m in height. Fuel arriving at the Site by road will be delivered into the fuel reception system for sorting and screening prior to transfer to the main fuel storage area for mixing with the ship borne fuel. Fuel will be transferred from the store to the Power Island via enclosed conveyors to reduce fugitive dust emissions and to keep the biomass dry. Further dust extraction systems will be installed in areas where formation of dust clouds is likely to occur. Physical separation of fuel in two fuel stores and within the stores themselves will assist stock control and act as a fire control measure. The Project will be fitted with comprehensive fire detection, alarm and fire fighting systems. Strict safety, health and environmental site procedures will be covered in an Environmental Permit and will be discussed with the relevant local emergency service, the Health and Safety Executive (HSE) and EA. The Project will be compliant with the relevant regulations for controlling explosive atmospheres and the standards of equipment and protective systems used in them to protect the health and safety of staff and the environment.

4.3.4. Mixed fuel will then be conveyed to the day store for onward transfer to the boiler house, during which it will pass through a metal removal and screening process to remove unwanted materials.

4.3.5. No chipping of any biomass material will take place at the Site.

[10] Recovered wood will comprise grades A, B and or C wood. Grade D wood will not be used. The grades mentioned here are as per the PAS 111:2012 Specification for the requirements and test methods for processing waste wood, Appendix A, Wrap, BSI, May 2012.

[11] The Renewables Obligation Order 2002.

4.4. Shipping and Operational Activities at the Port of Liverpool

4.4.1. Fuel will be delivered in vessels up to the size of Panamax ships, which are capable of carrying up to approximately 40,000 tonnes of biomass fuel. As stated in Section 4.2.3, up to four Panamax ships will visit the Dock each month. The Mersey estuary is the 3rd busiest river estuary in the UK. Existing shipping movements in the Mersey Estuary amount to approximately 16,000 per year[12]. It is estimated that the Project will require 1 ship per week to supply the Project with fuel. This would equate to 104 ship movements per year (52 ships in and out), which would result in an increase of less than 1% of shipping movements compared to the existing baseline. If the frequency of ships were doubled the result would be 208 ship movements per year which would result in an increase of 1.3% compared to the existing baseline. Therefore the proposed shipping movements would be indecipherable in the context of existing port operations.

4.5. Power Generation

4.5.1. The combustion technology for the Project has not been finalised: options include a bubbling fluidised bed (BFB) combustor or a circulating fluidised bed (CFB) combustor. Either one 150 MW or two 75MW boilers will supply steam to single steam turbine generating unit. The boiler hall would be situated in a building with a height of up to 65 m.

4.5.2. In a bubbling fluidised bed combustor air is blown through a hot bed of material comprising sand and ash particles. This causes bubbles to occur within the bed making it behave like a fluid with good agitation and mixing. Combustion temperatures and a long residence time are optimised in a fluidised bed boiler to ensure the burnout of the fuel is very high, resulting in a high efficiency combustion and emission control process.

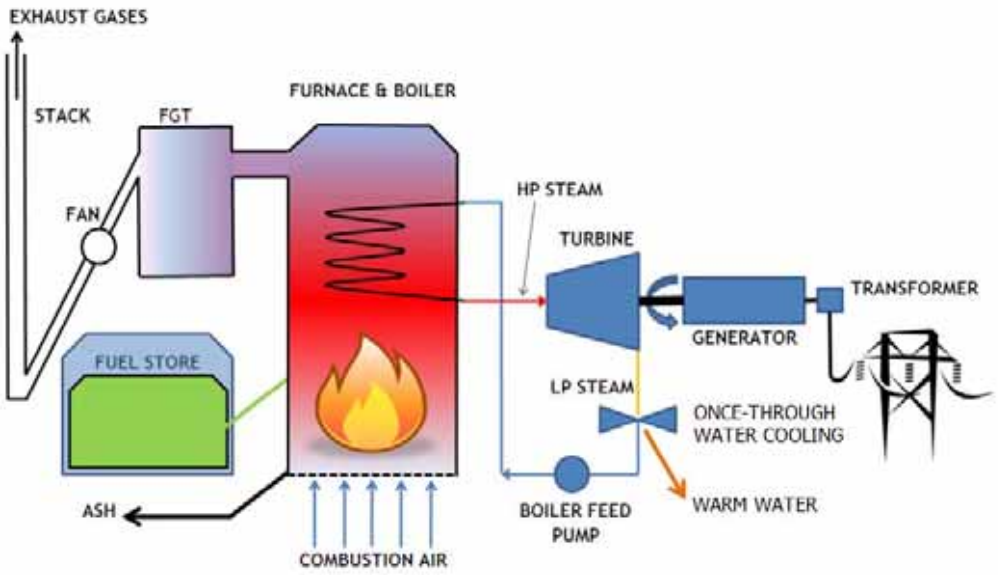
4.5.3. The bed of a CFB boiler, within which the fuel is combusted, is typically made-up of sand, which is fluidised by the injection of combustion air upwards from the base of the bed. The hot combustion gases carry the solid matter held in the furnace to the top of the combustion chamber where the heavier particles are recirculated back into the furnace by heavy duty cyclones. The hot combustion gases produce high pressure, high temperature steam which in turn is passed to a steam turbine electrical generator for the generation of electricity.

4.5.4. It is anticipated that up to approximately 25,000 tpa of ash and flue gas residues will be produced. It is RES' intention for the ash to be sold and recycled, as far as possible, for use in the construction and fertiliser industries. The ash will be transported from the Site in 20 tonne truck-loads, and if feasible, by ship or barge.

4.5.5. A schematic of the power generation process associated with the Project is provided in Diagram 2.

[12] Section 1.1 Mersey Ports Master Plan, Consultation Draft, June 2011. Available at: http://www.shipcanal.co.uk/assets/pdf/masterplan/Consultation_Draft.pdf.

Diagram 2: Schematic of the Power Generation Process



4.6. The Cooling System and Aqueous Discharges

4.6.1. There is a requirement for a cooling system, to cool the steam used in the power generation process once the high pressure and temperature steam has been exhausted through the steam turbine, and before it is returned to the boiler. Three methods are available; once-through cooling, air cooled condensers, and a hybrid cooling method. RES has undertaken preliminary assessment work regarding the preferred cooling option for this Project, comprising boiler efficiency tests and a cooling water outfall feasibility study. For the purposes of this ESR, the preferred method of cooling the steam is a once-through water cooling method. Further information relating to the preferred cooling method is included within Section 2.

4.6.2. Once-through water cooling consists of a high efficiency water-cooled condenser and a once-through cooling water system. It is the most energy efficient of the cooling technologies available for a Project such as this and is generally considered by the EA to represent BAT. This method would require the abstraction of water from an accessible water source and the discharge of water at a temperature of up to 10°C warmer than ambient water temperature. This is RES's preferred method of cooling for the Project.

4.7. Dredging

4.7.1. There is potential for a limited amount of maintenance dredging work linked to the ongoing operation of the Project to be undertaken within the dock area. This is to ensure that access is maintained for the vessels which could be used for the delivery of biomass fuel to the Project. The Port of Liverpool has confirmed that, in line with operations for other Port occupants and activities, they will undertake this in accordance with the Port's existing powers and licence arrangements. At present, a capital dredge is not anticipated for the Project. Therefore, dredging activities will be excluded from the Project EIA, and will be undertaken subject to routine Port of Liverpool permitted operations and existing licenses.

4.8. Flue Gas Treatment

4.8.1. The flue gases will exit the boiler and pass through a high efficiency dust collection and acid gas abatement system which will remove the vast majority of particulates and acid gases. The flue gases will then discharge to atmosphere via a chimney stack, currently estimated to be of the order of 105 m in height. This figure has been derived through preliminary air quality assessment, the results of which are presented in Appendix A. The definitive stack height will be determined during the EIA process through dispersion modelling.

4.8.2. The Project will burn a proportion of Grade C[13] recovered wood. Therefore, the emissions will need to be compliant the Waste Incineration Directive (WID)[14] (and associated national regulation[15]). The Industrial Emissions Directive (IED)[16] is expected to be implemented in January 2013, and therefore the application will also need to be IED compliant, which incorporates the requirements of the WID. RES intends to apply for an Environmental Permit (in line with relevant Environmental Permitting Regulations (England and Wales) 2010, hereafter referred to as EP Regulations)[17] from the EA following detailed engineering which will regulate the operation of the Project and include compliance with the WID and the IED.

4.9. Electricity Export

4.9.1. Electricity will be exported from the Site via an underground cable to the existing Bootle Grid Substation to the north east (see Figure 2). The route of the connection will be confirmed with the substation host, SP Manweb. The routing of the grid connection is included within the Indicative Red Line Boundary as it is an Associated Development to the Project. As such the potential environmental impacts of the proposed electrical connection will be assessed in the EIA process and reported on in the ES, and will therefore be included in the application for the DCO.

4.10. Combined Heat and Power (CHP) potential

4.10.1. RES is investigating the opportunity to operate the Project as a CHP facility. The objective of the work is to assess the technical and economical viability of CHP operation, which would increase the energy efficiency of the Project and would have wider environmental benefits by supplying renewable heat to nearby heat consumers. The heat generated from the CHP facility could be supplied to a range of potential users, including nearby industrial facilities or commercial and residential users through district heating.

4.10.2. The work undertaken to date has included a heat demand assessment in the proximity of the Project, through site visits and heat mapping. An initial technical and economical review was prepared to define a number of options for heat supply from the Project, including quantifying heat export and identifying indicative pipe network layouts. The study has also investigated capital and operational costs and economic benefit from heat sales and renewable energy incentives. Further studies are ongoing, comprising stakeholder engagement (direct communication with potential heat users) to confirm the scale of energy needs and potential interest and support for a CHP Project. Once this stage is concluded the business case evaluation can be refined, using more accurate data provided by heat users, and the identification of feasible options can be made.

4.11. Carbon Capture

4.11.1. It is not proposed to design or build the Project to be Carbon-Capture Ready (CCR) since it is below the 300 MWe threshold for the consideration of Carbon Capture Readiness as outlined in NPS EN-3.

[13] PAS 111:2012 Specification for the requirements and test methods for processing waste wood, Appendix A, Wrap, BSI, May 2012.
[14] Waste Incineration Directive (WID) 2000/76/EC.
[15] The Waste Incineration (England and Wales) Regulations 2002 (2002 No. 2980).
[16] Industrial Emissions Directive (IED) 2010/75/EC.
[17] Environmental Permitting Regulations (England and Wales) 2010.

5. Need for the Project: Legislative and Planning Policy Context

5.1. Introduction

5.1.1. A brief appraisal of the relevant legislative framework which essentially establishes the need for the development has been presented below along with an indication of the relevant planning policy framework, which will be taken into account in the preparation of the DCO application. A detailed assessment of relevant planning policy will be presented within the Planning Statement which will accompany the DCO application.

5.2. Climate Change and the Need for the Development

5.2.1. Climate change is a globally recognised concern and the impacts of human activity on our climate need to be addressed. In order to address the impacts of climate change a number of international legislative mechanisms have been put in place to ensure that globally, we reduce our carbon emissions.

5.2.2. The Kyoto Protocol, originally adopted in 1997, is an international agreement to which 37 countries, including the UK, have signed up to and which sets binding targets for the reduction of international greenhouse gas emissions (GHG). As part of this agreement the UK has committed itself to reducing its GHG by 12.5% on 1990 levels by 2008-2012 and has subsequently, already exceeded this target.

5.2.3. Further to this, in June 2009, the European Commission (EC) published the Renewable Energy Directive[18] which essentially requires all European Union (EU) Member States to source 20% of their overall Community gross final energy consumption by 2020 from renewable sources. Both these mechanisms provide the case at the international level for the UK to increase its renewable energy capacity and subsequently for the proposed development itself.

5.2.4. The principles and targets set within the Kyoto Protocol and Renewable Energy Directive have been translated at a national level through the implementation of the Energy White Paper (EWP) (May 2007), Climate Change Act 2008 and Low Carbon Transition Plan (July 2009). The Energy White Paper[19] sets out the Government's strategy with regards to renewables and advises that increasing the UK's renewable energy capacity will assist with working towards the Government's objectives of ensuring the short and long term security of energy supply and the reduction of GHG emissions in tackling climate change. The 2008 Climate Change Act[20] made the UK the first nation in the world to set legally binding 'carbon budgets', aiming to cut UK emissions by 34% by 2020 and at least 80% by 2050 on 1990 levels.

5.2.5. The Low Carbon Transition Plan[21] recognises that the UK has far exceeded its Kyoto GHG reduction commitments but recognises there is a long way to go in achieving the challenging targets set within the Climate Change Act. The Low Carbon Transition Plan commits to delivering emission cuts of 18% on 2008 levels by 2020 and over a one third reduction in 1990 levels (pg.4). In order to achieve these targets, there is a need for the UK to continue to increase its renewable energy production and secure a long term energy supply thus there is a clear need for this development. The need for an increase in renewable energy production is also recognised at a national level in the UK Renewable Energy strategy (July 2009)[22,] the National Renewable Energy Action Plan (NREAP) (July 2010)[23] and The Carbon Plan (Dec 2011)[24].

5.2.6. At a national level the need for the development is also fundamentally established within the Overarching National Policy Statement for Energy EN-1[25] which advocates that (para.3.1);

[18] Directive 2009/28/EC of the European Parliament of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repeating Directives 2001/77/EC and 2003/30/EC (Renewable Energy Directive) http://eur-lex.europa.eu//JOHtml.do?uri=OJ:L:2009:140:SOM:EN:HTML.
[19] The Energy White Paper (EWP) "Meeting the Energy Challenge", May 2007
[20] Climate Change Act 2008, http://www.legislation.gov.uk/ukpga/2008/27
[21] UK Low Carbon Transition Plan, July 2009
[22] The UK Renewable Energy Strategy, July 2009
[23] National Renewable Energy Action Plan for the United Kingdom. Article 4 of the Renewable Energy Directive 2009/28/EC
[24] The Carbon Plan: Delivering Our Low Carbon Future, HM Government, December 2011
[25] DECC, National Policy Statement EN-1 'Overarching NPS for Energy', July 2011.

- The UK needs all the types of energy infrastructure covered by this NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions.
- It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.
- The PINS should therefore assess all applications for development consent for the types of infrastructure covered by the energy NPSs on the basis that the Government has demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described for each of them in this Part.
- The PINS should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent under the Planning Act 2008.

5.2.7. The above European and National regulatory and policy framework form the basis of the need argument for this Project, in order for the UK to increase its use of renewable energy and reduce its GHG emissions.

5.3. Overview of Relevant Planning Policy Framework

5.3.1. In terms of the relevant planning policy framework upon which the planning application will be determined and which further supports the need argument for the development, this currently comprises the following key documents;

- National Policy Statements for Energy Infrastructure including
- EN -1 – Overarching Energy NPS;
- EN -3 – Renewable Energy Infrastructure;
- other national material considerations including Planning Policy Statements (PPSs) and Planning Policy Guidance (PPGs) and the draft National Planning Policy Framework; and
- the Development Plan including;
- North West of England Plan Regional Spatial Strategy (RSS) to 2021[26]; and
- Sefton Unitary Development Plan (UDP) (2006) (Saved policies).

5.3.2. The above, along with any emerging local planning policy, will all be taken into account in detail within the Planning Statement which will accompany the DCO application.

5.3.3. 'A Authorities', as defined in Section 43 of the Planning Act 2008 (and further clarified in the PINS' Advice Note 3), the adjacent Local Planning Authorities (LPAs) to Sefton MBC of Wirral BC, Liverpool CC, Knowsley Council and West Lancashire BC will be consulted with as part of the DCO application process. In this respect, where considered appropriate by the local authorities, the Planning Statement which will accompany the DCO application will consider other local policies set out within their Development Plans.

5.3.4. In addition, as part of the Government's Interim Report of July 2007, it was recommended that all major ports produce Port Master Plans and consult upon these with local stakeholders, including planning authorities, in order to help co-ordinate medium-term planning. The Port of Liverpool exceeds the threshold for being considered a major port and as such prepared a draft Master Plan for consultation in June 2011[27] The draft Master Plan sets out the Port's strategic growth objectives for the next 20 years and identifies the growth of renewable energy, particularly biomass and the Alexandra Dock renewable energy project, as strategic opportunities. The final Master Plan is scheduled to be published in 2012 and will be discussed in the context of the local development framework in the Planning Statement which will accompany the DCO application.

[26] North West of England Plan Regional Spatial Strategy to 2021 (September 2008), Government Office for the North West. London: TSO. Although this document is to be revoked and will no longer form a material planning consideration, it is considered best practice to include in the review of the relevant planning policy framework, as this document was previously used to inform and guide the development of Sefton UDP.

[27] Mersey Ports Master Plan, a 20 year Strategy for Growth, Peel Ports, June 2011.

6. Proposed Scope of the Environmental Impact Assessment (EIA)

6.1. Introduction

6.1.1. The key output of the EIA process is the ES, which sets out the predicted significant environmental effects of the proposed development. The ES will enable the PINS and consultees to determine whether the proposals (and associated impacts) are acceptable. Schedule 4 of the EIA Regulations states that the ES should describe the environmental effects on:

- 'Population, fauna, flora, soil, water, air, climatic factors, material assets, including architectural and archaeological heritage, landscape and inter-relationship between the above factors.'

6.1.2. The environmental effects of the Project will be addressed in accordance with the EIA Regulations under the environmental assessment headings detailed in column two of Table 2.

Table 2: Headings for the EIA

EIA Regulation	Headings proposed for the EIA
Population	Air Quality Noise and Vibration Traffic, Transport and Access Landscape and Visual Socio-Economics
Fauna	Terrestrial Ecology Estuarine Ecology
Flora	Terrestrial Ecology Estuarine Ecology
Soil	Hydrology, Geology and Soils
Water	Hydrology, Geology and Soils
Air, Climatic Factors	Air Quality
Material assets (architectural and archaeological heritage)	Landscape and Visual Cultural Heritage
Landscape and visual	Landscape and Visual
Inter-relationship between above factors	Cumulative Impacts Summary and Conclusions

6.1.3. Each individual environmental assessment will be presented within the ES. This document will be presented in a number of volumes and is likely to comprise the volumes and associated content as outlined in Table 3.

Table 3: Proposed ES Contents

ES Volume	Title	Content
1.	Non Technical Summary (NTS)	A non-technical summary of the findings and conclusions of EIA, presented in language that can be understood by non-specialist consultees.
2.	ES Main Text	Presentation of the findings and conclusions of the EIA undertaken in support of the application, for each of the following technical areas: • Air Quality and Climate Change; • Noise and Vibration; • Terrestrial Ecology; • Estuarine Ecology; • Hydrology, Geology and Soils; • Landscape and Visual Impacts; • Traffic, Transport and Access; • Cultural Heritage; and • Socio-Economics. This volume will also address consultee requirements identified as a result of consultation.
3.	ES Figures	Presentation of figures in support of the information presented in Volume 2.
4.	ES Appendices	Presentation of technical reports and data in support of the information presented in Volume 2.

6.1.4. In addition to the technical assessments discussed above, the ES will include a number of introductory chapters as follows (all of which will appear in Volume 2 of the ESR):

- Project Need and Alternatives - the Project will be described in relation to the national need for renewable energy projects. This will be based on an appraisal of national and regional policy, including the NPS for Renewable Energy. Consideration of alternatives in terms of the Project, the proposed Indicative Red Line Boundary and all of its components, technologies, together with a do nothing scenario will be considered as per the EIA Regulations;
- Project Description – this will include a description of the demolition and construction, operation and decommissioning stages of the development. This will include a summary of fuel supply and the sustainability and carbon footprint issues associated with sourcing, delivery and energy recovery. A detailed description of the process will be provided. Key information will be included such as construction programme, hours of working, Project size, Project features, vehicle movements, and other relevant aspects of the Project's associated development. Site plans including layout, section and elevations plans will be included to illustrate the Project;
- The Site, its Surroundings and Selection - A thorough summary will be provided of the Site and its surroundings, describing to the reader the setting of the Site and the prevailing geographical, environmental and socio-economic characteristics. This will put the subsequent environmental impact assessments into context. This section will also describes the factors pertinent to the selection of the site for this Project; and
- Summary of Residual, Cumulative and Interrelated Effects - This section of the ES will provide a summary of all predicted residual, cumulative and interrelated effects of the Project.

6.1.5. The information that will be presented in the ES for each of the technical environmental areas will include:

- Policy Overview – a brief summary of the relevant policies to each environmental topic will be included based on the Planning Statement submitted as part of the DCO application and the planning policy chapter submitted within the ES;
- Consultation Outcomes – a summary of consultation issues raised by Prescribed Consultees as well as the agreements arrived at with these consultees during the Project in relation to each individual environmental topic will be summarised. More detailed information on consultation will be provided within the Consultation Report;
- Assessment Methodology – the assessment methodology agreed with consultees and used to undertake the assessment of the environmental topic, and inparticular how significant effects are defined will be presented. This will include reference to the standards and regulation used to guide each environmental assessment;
- Baseline Conditions – baseline conditions for the Project in relation to each environmental topic will be presented. Information included in this section will involve at least one of the following: desk-based study; site work; and secondary data collation and review;
- Impact Assessment – the assessment of potential impacts of each environmental topic will be presented. Detail impact assessment work, such as calculations, will be provided in the form of an appendix to the ES;
- Mitigation and Enhancement Measures – following conclusion of the impact assessment, mitigation measures that are agreed to following consultation with consultees will be presented, aimed at avoiding, reducing, and offsetting any negative impacts. In addition, enhancement measures to maximise any positive impacts of the Project will be presented;
- Residual Effects – a review of the residual effects for each environmental topic following consideration of the proposed mitigation and enhancement measures will be presented;
- Cumulative and Interrelated Effects - the cumulative and interrelated effects of each environmental topic in relation to a list of cumulative developments, which will be agreed with consultees during the consultation process will be presented; and
- Conclusion and Summary – the conclusion of the impact assessment will be drawn for each environmental topic and a summary of the assessment presented.

6.1.6. Sections 6.2 to 6.10 of this ESR provides an overview of the information for each environmental topic that will subsequently be used to inform the full impact assessments and open formal consultation, the conclusion of which will be presented in the ES. In this ESR, the proposed scope of the EIA is presented in Sections 6.2 and 6.10 as follows:

- Section 6.2 Air Quality and Climate Change;
- Section 6.3 Noise and Vibration
- Section 6.4 Terrestrial Ecology
- Section 6.5 Estuarine Ecology
- Section 6.6 Hydrology, Geology and Soils;
- Section 6.7 Landscape and Visual;
- Section 6.8 Traffic, Transport and Access;
- Section 6.9 Cultural Heritage; and
- Section 6.10 Socio-Economic.

6.1.7. To assist consultees in preparing their scoping response, Sections 6.2 to 6.10 provide an overview of each of the proposed EIA Chapters in terms of what will be assessed in the EIA, a brief description of the baseline within the Indicative Red Line Boundary, the assessment methodology and mitigation considerations for possible impacts. Consultees are invited to comment on the methodologies (including appropriate guidance and legislation), sensitivity and mitigation considerations within their scoping responses.

6.2. Air Quality

Overview

6.2.1. The air quality impact assessment will comprise the identification of baseline air quality levels, dispersion modelling of operational emissions, optimisation of the main stack height and the assessment of the potential impacts on air quality from all aspects of demolition and construction, operation and decommissioning of the Project.

6.2.2. The combustion of the proposed biomass fuel will result in the emission to air of flue gases containing oxides of nitrogen (NO_x), carbon monoxide (CO) and particulates (including the PM_{10} and $PM_{2.5}$ fraction) and sulphur dioxide (SO_2), halides and some metals and trace organic species. The emissions of these pollutants will meet the requirements of the appropriate legislation and, following dispersion modelling, any limits and appropriate abatement will be agreed with the EA through consultation and the Environmental Permitting process. Due to the use of recovered wood as part of the fuel mix, the boiler specification and emissions from the Project will need to be compliant with the incineration of waste section of the IED[28], which will come into force in January 2013 and which incorporates the requirements of WID. The main stack height will be informed by the outcome of the air dispersion modelling assessment.

Baseline Description

6.2.3. Sefton MBC assesses air quality in its area with respect to the National Air Quality Standards (NAQS). Sefton MBC has declared three AQMAs to control and reduce concentrations of nitrogen dioxide and / or PM_{10} in parts of the Borough. Liverpool CC has also declared an AQMA as a result of elevated levels of nitrogen dioxide. Due to the relatively close proximity of the administration boundary of Liverpool CC to the Site, the impact of emissions on the Liverpool CC AQMA will be included in the assessment. A summary of these AQMAs is given below:

- Sefton MBC AQMA 1 for PM10 based around the location of Waterloo Primary School, Crosby Road North in Waterloo along a section of the A565;
- Sefton MBC AQMA 2 for nitrogen dioxide based around the location of the junction of the A5036 Princess Way with the A565 Crosby Road South in Seaforth;
- Sefton MBC AQMA 3 for PM10 and nitrogen dioxide based around the location of the junction of the A5058 Millers Bridge with the A565 Derby Road in Bootle; and
- Liverpool CC AQMA for nitrogen dioxide covering the whole of the city of Liverpool.

6.2.4. In Sefton MBC's latest Air Quality Updating and Screening Assessment[29] it is also understood that measured concentrations at four other locations indicated a potential or actual exceedance of the annual mean nitrogen dioxide air quality objectives.

6.2.5. Sefton MBC carries out an extensive air quality monitoring programme for the area, including a number of locations in the vicinity of the Site. The selection of suitable background air quality concentrations to be used in the assessment will be discussed and confirmed with Sefton MBC. Data on substances which are not monitored by the Borough will be obtained from suitable national surveys and reported on the Department for Environment, Food and Rural Affairs (DEFRA) UK Air Information Resource (UK AIR) website (http://uk-air.defra.gov.uk/) and other relevant data sources.

[28] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions
[29] Sefton Metropolitan Borough Council, Air Quality Updating and Screening Assessment, June 2009.

Assessment Methodology

Main Site Emissions

6.2.6. The air quality assessment will follow the EA documents Horizontal Guidance Note H1 – Annex (f) [30] and "Air dispersion modelling report requirements for detailed air dispersion modelling"[31]. It will comprise a review of ambient air quality and a detailed atmospheric dispersion modelling study of the main stack emissions. An assessment of other aspects of the Project will also be undertaken and these are described further below.

6.2.7. The review of existing air quality in the area will be undertaken to understand the baseline conditions, including the location and nature of existing sources of emissions in the locality of the Site and the location of sensitive receptors. These existing conditions will be determined by consultation with Sefton MBC, Liverpool CC and by site reconnaissance and data review. Data sources will include the Air Quality Review and Assessment studies (i.e. the Updating and Screening Reports) undertaken by Sefton MBC and Liverpool CC and also the local authorities' air quality monitoring data. No site-specific air quality monitoring is proposed as part of the assessment. The baseline air quality data used as part of the assessment will be agreed and confirmed with Sefton MBC, and also confirmed with Liverpool CC.

6.2.8. The existing air quality concentrations at the designated habitat sites will be obtained from UK AIR (http://uk-air.defra.gov.uk) and the UK Pollutant Deposition website (http://pollutantdeposition.defra.gov.uk/). The existing acid and nutrient nitrogen deposition rates will be obtained from the UK Air Pollution Information System (UK APIS) (http://www.apis.ac.uk/).

6.2.9. The atmospheric dispersion modelling study of operational emissions will be undertaken using the Atmospheric Dispersion Modelling System (ADMS), Version 4.2. This will optimise the main stack height and determine the process contribution of substances released from the Project. ADMS is widely used by industry and the regulatory authorities, including the EA.

6.2.10. Further justification of the choice of the ADMS dispersion model will be presented within the impact assessment. In line with the EA guidance, it is proposed to utilise five years (2007 - 2011) of hourly sequential meteorological data. Due to the location of the Project, it is proposed that data from the Crosby Meteorological Station is used.

6.2.11. Given the relatively flat nature of the surrounding area, it is not proposed to incorporate terrain influences within the modelling study. The structural influences of buildings (i.e. building downwash) within the Project will be considered.

6.2.12. A variable surface roughness file will be used to incorporate the influences of the sea on dispersion from the Project. We do not propose to use the Coastline module of the dispersion model as the site is located within an estuary environment rather than in a coastal environment. Therefore, the Coastline module is not applicable.

6.2.13. A model domain will be identified within which airborne concentrations of released substances will be modelled. This is likely to comprise a grid extending approximately 5 km by 5 km, in an east-west and north-south direction, centred on the Site. Concentrations within this grid will be calculated at 50 m intervals within the grid. In addition, concentrations will be modelled at the Sefton MBC and Liverpool CC AQMAs and at a selection of Sefton MBC air quality monitoring locations so that the impact magnitude and description of change can be identified, based on the Environmental Protection UK (EPUK) guidance, Development Control: Planning for Air Quality[32]. The sensitive receptors to be included in the assessment will be agreed and confirmed with Sefton MBC.

[30] Environment Agency, H1 Environmental Risk Assessment H1 Annex (f), December 2011.
[31] Environment Agency, Air dispersion modelling report requirements (for detailed air dispersion modelling).

[32] Environmental Protection UK, Development Control: Planning for Air Quality (2010 Update), April 2010.

6.2.14. The dispersion modelling study will be used to determine the most appropriate height for the chimney stack based on the resultant maximum short term and long term ground level concentrations predicted. This will take the proximity of the Sefton MBC AQMAs into consideration. A preliminary stack height assessment (see Appendix A), using ADMS 4.2, indicates that a stack height in the order of 105 m is likely to be required, for a plant with a capacity ranging between 100 and 150 MWe to meet long term and short term air quality objectives and guidelines. This height will be confirmed as part of the ES.

6.2.15. Direct comparison will be made between the long-term and short-term process contribution from the Project, the predicted environmental concentrations of relevant substances (i.e. process contribution plus background levels) and the limits and objectives within the relevant Air Quality Regulations. Where appropriate, the significance of the potential impact will be determined using the criteria set out in the EPUK guidance.

6.2.16. Sensitivity analyses will be carried out to investigate the effect of altering some of the model input parameters and to ensure the dispersion model predictions are robust.

6.2.17. An outline health impact assessment will be carried out, if required, following consultation with the relevant consultees. If an outline health impact assessment is required, it will consider the emissions of nitrogen dioxide, sulphur dioxide, particulates, metals and dioxins and trace organic species from the main stack. The conclusions of this assessment will inform the socio-economic impact assessment.

6.2.18. Contour plots of the model results for key substances will be produced for illustrative purposes.

6.2.19. The impacts of the Project on local air quality will also be addressed in combination with those from other proposed developments as discussed in Section 6.11, Cumulative Impact. The definitive list of cumulative developments to be included in the air quality assessment will be confirmed with Sefton MBC and Liverpool CC.

6.2.20. Changes in air quality levels (for nitrogen dioxide, sulphur dioxide and ammonia) will be assessed with respect to ecology for the statutory designated habitat sites within 10 km of the Indicative Red Line Boundary. We will also consider the non-statutory habitat sites within 2 km of the Project as specified in the EA H1 guidance.

6.2.21. An acid and nutrient nitrogen deposition assessment will also be carried out at the European and nationally designated habitat sites (SAC, SPA, RAMSAR and SSSIs).

6.2.22. These assessments will only be carried out at locations that occur above the mean high water mark. All locations in the sea or below the mean high water mark will be regularly covered and inundated by open water and the impact due to airborne concentrations and deposition of pollutants at these locations would be negligible due to the mass dilution of the sea. Therefore, deposition to the Estuary is not considered necessary to be included in this assessment.

6.2.23. A list of the statutory designated sites within 10 km and locally designated sites within 2 km of the Site is given in Table 4. Further details of these sites are provided in Section 6.4.

Table 4: Designated Habitat Sites for inclusion in Acid and Nutrient Deposition Assessment

Designation	Site Name	Grid Reference	Distance (km) and direction from Site
Special Areas of Conservation (SAC)	Sefton Coast	SD281099	2.4 NW
Special Protection Areas (SPA) / Ramsar Sites	Ribble & Alt Estuaries	SD 375240	2.4 NW
	Mersey Narrows and North Wirral Foreshore[33]	SJ 315 949	1.5 SW
	Mersey Estuary	SJ 440800	8.3 S
Sites of Special Scientific Interest (SSSI)	Mersey Narrows	SJ 315 949	1.5 SW
	North Wirral Foreshore	SJ 250920	1.7 SW
	Sefton Coast	SD 295 106	2.4 NW
	New Ferry	SJ 340 862	8.3 S
	Mersey Estuary	SJ 440 800	8.3 S
	Meols Meadows	SJ 245 903	9.2 SW
Locally designated habitat sites within 2 km			
Sefton Local Wildlife Sites (LWS)	Seaforth Nature Reserve	SJ318 971	2.0 NW
	Rimrose Valley and Canal	SJ 331 986	1.7 N
Liverpool Local Wildlife Sites (LWS)	Leeds-Liverpool Canal	SJ 338 950	1.7 S
	Melrose Cutting	SJ 344 935	1.8 SSE
Local Nature Reserves (LNR)	Brook Vale	SJ 330 975	1.6 N

6.2.24. An assessment of the accumulation of trace metals potentially released will be carried out. For this assessment the deposition rates of the trace metals will be calculated based on the EA H1 guidance.

Assessment Criteria

6.2.25. In the UK, both statutory and non-statutory air quality objectives and guidelines exist. The statutory air quality objectives are referred to as Air Quality Objectives (AQO) and the non-statutory guidelines are referred to as Environmental Assessment Levels (EALs). Air quality in compliance with these AQOs and EALs is considered to have no significant adverse effects on health or the environment. Air quality above these objectives and guidelines could potentially have an adverse effect, although a considerable "margin of safety" is built into many of the guidelines.

6.2.26. In the UK, statutory air quality objectives exist for five pollutants of relevance to this Project: CO, nitrogen dioxide (NO_2), particulate matter of aerodynamic diameter less than 10 µm (PM_{10} and $PM_{2.5}$) and SO_2. The maximum permissible concentrations of these pollutants in ambient air are set out in the Air Quality Regulations[34].

6.2.27. Target values are also set pit for arsenic (As), benzo(a)pyrene, cadmium (Cd) and nickel (Ni). Target values and long-term objectives are also specified for ozone (O_3).

[33] Proposed SPA and Proposed Ramsar.
[34] Statutory Instrument 2010 No. 1001. Environmental Protection. The Air Quality Standards Regulations 2010.

6.2.28. The limits are based on the current understanding of the health effects of exposure to air pollutants and have been specified to control health and environmental risks to an acceptable and low level. They apply to places where people are regularly present. The AQOs are designed such that air quality in compliance with these guidelines presents no more than an extremely small and insignificant risk to human health, based on current scientific knowledge. The AQOs and targets which are relevant to this study are summarised in Table 5.

Table 5: Air Quality Standards

Pollutant	Concentration (Microgram/cubic metre, µg/m^3)	Measured as
Carbon monoxide	10,000	Maximum daily 8 hour running mean
Nitrogen dioxide	40	Annual mean
	200	1 hour mean not to be exceeded more than 18 times per year (equivalent to the 99.8th percentile)
Oxides of nitrogen	30	Annual mean limit value for the protection of vegetation (referred to as the "critical level")
Particles (PM_{10})	50	24 hour mean not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile)
	40	Annual mean
Particles ($PM_{2.5}$)	25	Annual mean
Sulphur dioxide	350	1 hour mean not to be exceeded more than 24 times per year (equivalent to the 99.7th percentile)
	125	24 hour mean not to be exceeded more than 3 times per year (equivalent to the 99.2nd percentile)
	266[1]	15 minute mean not to be exceeded more than 35 times per year (equivalent to the 99.9th percentile)
	20	Annual mean and winter mean limit value for the protection of vegetation (referred to as the "critical level")
Arsenic[2]	0.006	Annual mean
Benzo(a)pyrene	0.001	Annual mean
Cadmium	0.005	Annual mean
Nickel	0.02	Annual mean
Note 1: The 15 minute mean sulphur dioxide concentration is not included in Statutory Air Quality Objectives but has been considered here for completeness. Note 2: The more stringent EAL value for arsenic in Table 6 is used in preference to the AQO set out in Table 5.		

6.2.29. In addition to the UK AQOs, EALs exist for the other substances assessed in this study, with the exception of dioxins and furans and volatile organic compounds (VOCs). The term "volatile organic compounds" covers a wide range of substances. There is no air quality standard for VOCs collectively.

6.2.30. EALs for other substances included in this study are given in Table 6.

Table 6: Other EALs relevant to this study

Pollutant		Concentration ($\mu g/m^3$)	Measured as
Hydrogen chloride (HCl)		750	Maximum 1 hour mean (EPAQS recommendation)
Hydrogen fluoride (HF)		16	Annual mean
		160	Maximum 1 hour mean (EPAQS recommendation)
		0.5	Maximum weekly mean guideline for protection of vegetation and ecosystems
Ammonia		180	Annual mean
		2500	Maximum 1 hour mean
		1	Annual mean guideline for protection of vegetation for sensitive communities where lichens and bryophytes are an important part of the ecosystem (referred to as the "critical level")
		3	Annual mean guideline for protection of vegetation for all higher plants (all other ecosystems) (referred to as the "critical level")
Antimony (Sb)		5	Annual mean
		150	Maximum 1 hour mean
Arsenic (As)[1]		0.003	Annual mean
Chromium (Cr)	Cr (II & III)	5	Annual mean
		150	Maximum 1 hour mean
	Cr (VI)	0.0002	Annual mean
Copper (Cu)		10	Annual mean
		200	Maximum 1 hour mean
Manganese (Mn)		0.15	Annual mean
		1,500	Maximum 1 hour mean
Mercury (Hg)		0.25	Annual mean
		7.5	Maximum 1 hour mean
Vanadium (V)		5	Annual mean
		1	Maximum 24 hour mean
Oxides of nitrogen		75	Maximum 24 hour mean guideline for protection of vegetation and ecosystems
Sulphur dioxide		10	Annual mean guideline for protection of vegetation and ecosystems where moss / lichens are a key habitat feature
Note 1: The more stringent EAL value for arsenic is used in preference to the AQO set out in Table 5.			

6.2.31. For the assessment of impacts at designated habitat sites the modelled air quality concentrations will be compared against the relevant environmental assessment levels (critical levels) listed in Table 6. In addition, the relevant critical loads for this assessment will be obtained from the UK Air Pollution Information System (http://www.apis.ac.uk/).

6.2.32. The assessment of the accumulation of heavy metals will be compared against the maximum deposition rates listed in Table B8 of the H1 guidance, where available.

Significance Criteria

6.2.33. In addition to the assessment criteria set out in Table 5 and Table 6 the impact of nitrogen dioxide at the AQMAs will be assessed using the EPUK criteria**Error! Bookmark not defined.**.

6.2.34. The EPUK assesses the significance of the potential increases due to the Project emissions using guidance produced by EPUK. The EPUK guidance takes three aspects into account when determining the overall significance. These are:

- the magnitude of change in relation to the air quality objectives;
- air quality impact descriptors which take into account the magnitude of change and the absolute concentrations in relation to the air quality objectives; and

- a judgement of the overall significance based on a number of factors which also include the impact descriptors above.

6.2.35. The definitions of impact magnitude used in the assessment of long term concentrations are set out in Table 7. These relate to changes in the annual mean concentration in relation to the annual mean air quality objective or EAL. For example, a negligible change is a change which is less than 1% of the air quality objective value. A low change is identified when the change is between 1% and 5% of the air quality objective, and so on.

Table 7: Impact magnitude for changes in annual mean concentrations with respect to the AQO / EALs

Magnitude of change	Increase/decrease in annual mean
High	>10%
Medium	5% - 10%
Low	1% - 5%
Negligible	< 1%

6.2.36. Table 8 outlines a description of the impact associated with the changes in annual mean concentrations when taking the total concentrations into account, as described by the EPUK guidance. An imperceptible change (i.e. a change of less than 1% of the value of the annual mean air quality objective) is described as having a 'negligible' impact regardless of the absolute (total) concentration.

Table 8: Air quality impact description for changes to annual mean nitrogen dioxide or PM_{10} concentrations

Absolute concentration in relation to objective	Changes in concentration		
	Low	Medium	High
Increase with Development			
Above objective with scheme (i.e. Predicted Environmental Concentration (PEC) is above the air quality objective or EAL)	Low adverse	Medium adverse	High adverse
Just below objective with scheme (i.e. PEC is 0% - 10% below the air quality objective or EAL)	Low adverse	Medium adverse	Medium adverse
Below objective with scheme (i.e. PEC is 10% - 25% below the air quality objective or EAL)	Negligible	Low adverse	Low adverse
Well below objective with scheme (i.e. PEC is >25% below the air quality objective or EAL)	Negligible	Negligible	Low adverse
Note 1: based on the magnitude in Table 7			

6.2.37. For the assessment of short-term average concentrations such as the 15-minute mean sulphur dioxide or 1-hour mean nitrogen dioxide concentrations, impacts are described using the following criteria:

- If the PC is less than 10% of the short-term air quality objective or EAL, this would be classed as negligible in the same way as an negligible increase in long-term means is described above;
- If the PC is greater than 10% of the air quality objective or EAL, but less than 20% of the headroom between the baseline concentration and the air quality objective or EAL, this can also be described as a negligible impact.
- If the PC is greater than 20% of the headroom, a judgment based on the PEC similar in nature to that set out in Table 8 would be made.

6.2.38. The factors to judge the overall significance of the air quality impacts as set out in the EPUK guidance are as follows:

- Number of properties affected by low, medium or high air quality impacts and a judgement on the overall balance;

- The magnitude of the changes and the descriptions of the impacts at the receptors;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Uncertainty, including the extent to which worst-case assumptions have been made; and
- The extent to which an objective or limit value is exceeded, e.g. an annual mean nitrogen dioxide of 41 $\mu g/m^3$ should attract less significance than an annual mean of 51 $\mu g/m^3$.

Assessment Methodology – Other Aspects

6.2.39. The potential impact of emissions arising from road traffic (for the demolition and construction, and operation) will also be considered, following the guidance given in DEFRA's Local Air Quality Management Guidance[35] and EPUK guidance. This will follow a staged approach to determine the need for a detailed assessment. The methodology and emission factors to be used in any detailed traffic assessment will be confirmed with Sefton MBC.

6.2.40. Fugitive dust emissions during the demolition and construction phase and decommissioning phase will be considered.

6.2.41. The frequency of visibility of the water vapour plume from the main stack will be assessed.

6.2.42. The abatement of emissions to air will be discussed in relation to the severity of impact, frequency of emission and comparison with relevant standards.

6.2.43. The potential impact of odour as a result of the proposed development has been discussed informally with key consultees to date. Odour is not likely to be an issue as the design of the Project layout will be such that fugitive releases of odour will be controlled by using appropriate mitigation measures and wood-based biomass is an inherently low-odour fuel. For example, the biomass will be stored in enclosed buildings or silos, and the fuel will be used on a first in, first out basis. The potential impact of odour will be considered in the assessment and presented within the ES.

6.2.44. The main impact that the Grid Connection Route may have on air quality is related to fugitive dust emissions during the construction phase. These emissions will be controlled by mitigation measures provided for the control of dust during construction.

Potential Mitigation Measures

6.2.45. The following mitigation considerations could be adopted where practicable during the demolition and construction phase (including the Grid Connection Route) and operation and decommissioning phases of the development. This list is not exhaustive, and additions or changes will be made as a result of consultation and the full assessment work. Where applicable, these will be discussed in more detail in the ES:

- Demolition and Construction, and Decommissioning:
- water spray dampening of soils and spoil will be undertaken to suppress dust, and prevent dust blow during hot, dry weather conditions;
- vehicle speeds will be limited to less than 20 miles per hour (mph) on unsurfaced areas of the Site;
- sheeting of lorries during transportation of friable demolition and construction materials and spoil; and
- wheel washing facilities for vehicles entering the public road system.
- Operation:
- the use of advanced combustion technology to raise efficiency and reduce the generation of emissions;
- the use of intrinsically low sulphur fuel;

[35] 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.

- a high efficiency dust collection system (bag-filters) which will control emissions of particulates;
- appropriately designed stack to ensure adequate dispersion of emissions to atmosphere; and
- vacuum hoppers, enclosed conveyors and enclosed fuel storage will be used to control emissions of fugitive dust.

6.3. Noise and Vibration

Overview

6.3.1. This chapter of the scoping report describes the baseline noise and vibration conditions currently existing around the Site. It describes the methodology and criteria for assessment of demolition and construction, operational, traffic and decommissioning noise assessment, and potential mitigation considerations to prevent, reduce or offset any significant adverse effects. The aim has been to identify potential impacts on sensitive receptors with regard to the existing conditions in the local area.

Baseline Description

6.3.2. The nearest noise-sensitive receptors in the vicinity of the proposed Site were identified, together with representative noise monitoring points (NMP). A programme of noise monitoring at those locations was agreed with Sefton MBC's Environmental Health Department on 3rd February 2011 and was undertaken on 8th and 10th February 2011. In light of recent minor modifications to the Project boundary, to include the water cooling infrastructure, further consultation will be undertaken with the Environmental Health Department to confirm the suitability of the locations previously agreed. Further background monitoring will be undertaken if required, but at this stage we consider the monitored locations to still represent the most appropriate receptor locations. These locations are described below and are presented on Figure 3.

- **NMP1 - Church Gardens:** located approximately 520 m south east of Alexandra Dock, this location is representative of the noise levels at residential properties to the south east of the Site. Monitoring at this location was undertaken on the road side adjacent to residential properties.
- **NMP2 - Ronan Close:** located approximately 370 m east of Alexandra Dock, this location is representative of the noise levels at residential properties to the east of the Site. Monitoring at this location was undertaken at the end of Browning Street to the rear of the properties on Ronan Close and adjacent to open land.
- **NMP3 - Peel Road:** located approximately 670 m north east of Alexandra Dock, this location is representative of the noise levels at residential properties to the north west of the Site. Monitoring at this location was undertaken on the road side adjacent to residential properties and the A565 Primrose Road.

6.3.3. These locations are considered to be representative of the surrounding residential areas. It should be noted that these locations have been used as reference points for determining the existing background noise levels in the vicinity of the Site and for the setting of appropriate noise criteria.

6.3.4. Background noise levels at NMP1, NMP2 and NMP3 were determined through a series of measurements undertaken during the day of Thursday 10th February 2011 (0900 to 1230) and during the night of Tuesday 8th February 2011 (0100 to 0430). It was agreed with the Sefton MBC Environmental Health Department that these periods were representative of the quietest periods during the proposed operating times of the Project. Measured noise levels during these periods are thus considered to provide the lowest existing background levels.

6.3.5. Noise monitoring was undertaken in accordance with the most relevant standards and guidelines, including guidance in BS 4142:1997[36]. Further details of the noise monitoring methodology are provided in Appendix C.

[36] British Standard Institution, BS 4142:1997, Method for Rating industrial noise affecting mixed residential and industrial areas.

6.3.6. A summary of the measured noise levels at each location are presented in Appendix D for the daytime and night-time period respectively. During the monitoring periods climatic conditions were conducive to environmental noise measurements, with dry, mild and calm (wind speeds ranging from 0.5 to 3.0 m/s) conditions throughout. Full noise monitoring tables can be found within Appendix D.

6.3.7. The existing noise climate in the area surrounding the Site is considered to be typical of an industrial/urban residential area due to its close proximity to Port of Liverpool docks and a number of busy roads, including the A565. Existing daytime noise levels are dominated by road traffic on the A565 and dock operations. Night-time noise levels are dominated by dock operations including HGV movements and intermittent impulsive noises such as 'bangs' and 'crashes' associated from loading operations on the dock. Furthermore, intermittent road traffic also contributed to the noise climate during this time. However, it was noted that the dock operations were concentrated to the north of the proposed Site, in the proximity of NMP3. Noise levels during the night-time period would be expected to increase from around 05:00 due to increased traffic on the surrounding road network prior to the start of the morning rush hour.

6.3.8. As a summary, the baseline noise environment contains relatively high noise levels during the day and night due to the busy nature of the nearby roads and activities at the port. This is typical of areas with major road links and industrial areas.

Assessment Methodology

6.3.9. The noise and vibration assessment will consider all of the potential noise and vibration impacts on sensitive receptors in and around the vicinity of the Site in accordance with the most relevant national and local standards and guidelines.

6.3.10. The Government's policies on noise related planning issues are set out within the 'Noise Policy Statement for England (NPSE)' (2011) and PPG24: Planning and Noise'' (1994).

6.3.11. The NPSE provides clarification to the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The principal aims of the NPSE are stated as follows:

6.3.12. "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life;
- and where possible, contribute to the improvement of health and quality of life."

6.3.13. PPG24 gives guidance to local authorities in England on the use of their planning powers to minimise the adverse impact of noise. Specifically, it outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise. It also introduces the concept of Noise Exposure Categories (NEC) for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise.

6.3.14. In its consideration of noise and vibration from industrial and commercial developments, PPG24 refers to a number of British Standards and other guidance documents that contain appropriate criteria against which to assess any impacts. Specifically, PPG24 refers to the following documents that are relevant to the assessment of the Project:

- 'British Standard BS4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas' is referenced as the appropriate standard against which to assess industrial type noises;
- 'British Standard BS8233:1999, Sound Insulation and Noise Reduction for Buildings - Code of Practice', which provides general guidance on acceptable noise levels within buildings; and,
- 'Guidelines for Community Noise', World Health Organisation (WHO), 1999, provides recommendations for internal and external noise levels. It is commonly referred to when determining appropriate noise limits for situations that fall outside the scope of BS8233.

Demolition and Construction Noise and Vibration

6.3.15. A demolition and construction noise and vibration assessment of the proposed development and construction areas including the Grid Connection Route will be undertaken following the guidance in BS5228: 2009[37]. The exact construction methodology is unlikely to be defined until the construction contractor is appointed, which is likely to be after the DCO application is submitted. However, the outline demolition and construction methodology will be included in the ES. The assessment will therefore be based on the information available to the assessment team, including the demolition phases, and assumptions regarding typical equipment likely to be used for all of the construction-related works, including any drilling and piling activities. Where uncertainties exist, worst case assumptions will be used. The ES will recommend that a Construction Noise Management Plan (CNMP) is prepared prior to commencement of the demolition and construction works. The plan will be used to ensure any impact on sensitive receptors is minimised.

6.3.16. BS 5228-1:2009 gives recommendations for basic methods of noise control relating to construction and open sites where work activities generate 'significant noise' levels, including industry-specific guidance. The legislative background to noise control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. BS 5228-1:2009 provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.

6.3.17. BS 5228-1:2009 includes example thresholds of 'significant effects' (considered to be the potential for disturbance) at residential dwellings, based on the existing ambient noise level. These thresholds can be based on the 'ABC' method or the '5 dB(A) change' method', described below in paragraph 6.3.20. BS 5228 also provides examples of thresholds (in terms of noise level and duration of works) above which noise mitigation measures, for example noise insulation, should be provided. The thresholds in BS 5228-1:2009 are examples, and therefore there is scope for them to be adapted if deemed necessary under local circumstances. It is not considered necessary to adapt the levels in this case, as the existing environment in the area already contains noise from the docks area which has similar characteristics to construction noise (engines, occasional bangs, reversing beepers).

6.3.18. The impact of underwater noise and vibration on marine mammals will be consulted on. If deemed necessary due to the nature of the activities within the Mersey Estuary and the presence of marine mammals in the area of influence, the impacts of this will be assessed. This assessment would be undertaken in conjunction with the Estuarine Ecology Assessment.

Assessment Methodology: Operational Noise and Vibration

6.3.19. Operational noise will be assessed using the methodology set out in British Standard BS 4142:1997 'Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'. This method predicts the likelihood of complaints about noise from industrial developments. This method requires that noise from the industrial noise sources(s) concerned (specific noise) is compared with the background noise level prevailing in the absence of the specific noise.

6.3.20. A Noise Rating Level (NRL) is calculated for operations on-site. A 5 dB penalty is added to the specific noise level to account for any impulsive or tonal characteristics of the noise source. The likelihood of the noise giving rise to complaint is then estimated by subtracting the Background Noise Level from the Noise Rating Level, with the likelihood of complaints being predicted as follows:

- the greater the difference the greater the likelihood of complaints;
- a difference of around +10 dB or more indicates that complaints are likely;
- a difference of around +5 dB is of marginal significance; and
- if the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

[37] British Standard Institution, BS5228: 2009, Code of practice for noise and vibration control on construction sites – Part 1: Noise.

6.3.21. Noise levels from the Site will be predicted within a computer based noise model such as, LimA or Sound Plan, which, for industrial noise, uses the algorithms in ISO 9613:1996 'Acoustics -- Attenuation of sound during propagation outdoors'[38]. The computer based model will be used to generate noise contour plots showing propagation of noise from the proposed development. It is unlikely that the final design of the Site will be available during the period in which the ES is prepared, as procurement of individual components is unlikely to have been completed. Therefore noise emissions for individual components and acoustic performance of the buildings will be estimated based on the latest design of the Site, example manufacturers' specifications and measurements previously taken of similar components on other facilities. Where uncertainties exist, worst-case assumptions will be made. If the model shows that there is potential for a significant effect to be generated by noise from the at any of the sensitive receptors, the level of noise mitigation that would be required would be specified, and measures that could be used to achieve this level of mitigation will be incorporated into the model, to provide a 'with mitigation' scenario.

6.3.22. The ES will recommend that a noise management plan for the operational phase of the development is completed during the final design phase. The plan will include updating the noise model to reflect the actual components and ensure that the final design incorporates appropriate mitigation measures.

6.3.23. It is anticipated that there will be no noise impacts from operation of the proposed Grid Connection Route. It has therefore been 'scoped out' of this assessment.

6.3.24. It is not anticipated that there will be any vibration impacts from the Project. Operational vibration will therefore be 'scoped out' of the assessment.

Assessment Methodology: Changes in Road Traffic Noise

6.3.25. The area around the Site currently experiences a high volume of HGV traffic associated with the nearby industry and docks. The potential change in traffic noise due to the Project will be confirmed in a screening exercise which will use baseline and 'with development' traffic data to establish the likely change in noise levels as a result of the proposed development. The change will be calculated based on the overall traffic levels, speed and HGV percentages and the methodology provided in 'Calculation of Road Traffic Noise' (CRTN) Department of Transport (DoT) 1988[39]. If the change in noise emissions of every road link is less than 1 dB(A), there will be no potential for changes in traffic to generate significant noise impact and no further assessment will be undertaken. If the change in noise level for any road link is greater than 1 dB(A), then road traffic noise models of the area around the proposed development will be produced in LIMA, using the CRTN algorithms. If this is the case, LIMA will be used to produce 'noise level change' contour plots.

Assessment Criteria

6.3.26. The following noise assessment criteria will be used for the Project. The receptors, impact and significance will be defined using the criteria in Tables 9, 10 and 11. These criteria have been developed for use in this assessment based on previous experience and the guidance set out in the draft 'Guidelines for Noise Impact Assessment' (Institute of Environmental Management and Assessment (IEMA) / Institute of Acoustics (IOA), 2002).

6.3.27. The guidelines provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- the appropriateness of the noise parameters used for the situation;
- the reference time period used in making the assessment;
- the level, character and frequency content of the noise sources under investigation; and
- how the predicted noise levels relate to relevant standards and guidelines.

[38] International Standard, ISO 9613:1996, Acoustics - Attenuation of sound during propagation outdoors.
[39] Department of Transport (1988) Calculation of Road Traffic Noise.

Table 9: Receptors

Designation	Development Receptors
International	Receptors with the highest sensitivity to noise including World Heritage Sites. Habitats supporting internationally important species that are considered to be sensitive to noise.
National	Noise sensitive receptors including hospices and places of worship. Habitats supporting nationally important species that are considered sensitive to noise.
Regional	Noise sensitive receptors including residential dwellings, schools, hospitals and places of quiet recreation (e.g. Country Parks). Habitats supporting regionally important species that are considered sensitive to noise.
County & Borough	Receptors including offices and play areas. Habitats supporting locally important species that are considered sensitive to noise.
Local/Neighbourhood	Receptors of the lowest sensitivity to noise (e.g. industrial estates). Habitats which support commonplace species of little value or which are not considered sensitive to noise

Table 10: Significance Criteria

Designation	Development Receptors
High	Impact resulting in a considerable change in baseline environmental conditions (i) with severe undesirable/desirable consequences on the receiving environment or (ii) large possibly causing statutory objectives to be exceeded
Medium	Impact resulting in a discernible change in baseline environmental conditions (i) with undesirable/desirable conditions or (ii) slight possibly causing statutory objectives to be exceeded
Low	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated
Negligible	No discernible change in the baseline environmental conditions
Note: the categorisation of the increase is dependent on the specific methodology used for the construction, road traffic and industrial noise assessment and will be fully explained in the noise chapter within the ES	

Table 11: Significance

Magnitude of Effect	Sensitivity of Receptors				
	International	National	Regional	County & Borough	Local / Neighbourhood
High	Substantial Significance	Substantial Significance	Moderate Significance	Moderate Significance	[1]
Medium	Moderate Significance	Moderate Significance	Minor Significance	[2]	Neutral Significance
Low	Moderate Significance	Minor Significance	[2]	Neutral Significance	Neutral Significance
Negligible	[1]	[2]	Neutral Significance	Neutral Significance	Neutral Significance
[1] The choice between 'Moderate Significance', 'Minor Significance' and 'Neutral Significance' will depend on the specifics of the impact and will be down to professional judgement and reasoning.					
[2] The choice between 'Minor Significance' and 'Neutral Significance' will depend on the specifics of the impact and will be down to professional judgement and reasoning.					

Potential Mitigation Measures

6.3.28. In order to ensure that noise disturbance is minimised during the demolition and construction phase of the development, a CNMP will be prepared and agreed with Sefton MBC. The plan could incorporate some or all of the following noise mitigation measures;

- good maintenance of all construction-related equipment to ensure that excessive noise and vibration levels are not generated;
- effective planning of demolition and construction deliveries and routing;
- regular integrity checks of noise mitigation measures fitted to equipment. Such measures could include silencers and engine covers. Where repair or replacement is required, equipment will, where possible, be taken out of service until the repair or replacement of parts has been undertaken;
- all equipment should be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable;
- equipment would be switched off when not in use;
- stationary noise sources will be sited as far away as reasonably possible from residential properties and where necessary acoustic barriers should be used to shield them;
- liaison with residents will ensure they are kept informed of any activities which could otherwise cause disturbance; high revving of engines will be minimised; and
- registration of the construction works under the Considerate Constructors Scheme (www.ccscheme.org.uk). Membership of the scheme requires sites to minimise disruption to neighbours and submit to regular inspections.

6.3.29. To ensure that noise generation is minimised during operation, a noise management plan would be implemented and could contain some or all of the following measures, to be confirmed through further assessment and consultation:

- planning and implementation of haulage routes to reduce impact on potential receptors;
- improved and/or additional enclosure to achieve improved sound attenuation reducing the impact on receptors;
- planning and implementation of noise barriers and/or openings within building envelopes;
- good maintenance of equipment to ensure that excessive noise and vibration levels are not generated;
- equipment to be switched off when not in use; and
- all noise mitigation measures fitted to items of equipment to be inspected regularly and external noise emissions monitoring will be carried out to ensure their effectiveness.

6.4. Terrestrial Ecology

Overview

6.4.1. The Project has the potential to have an impact on a variety of terrestrial ecological receptors, including designated sites, habitats and species. Issues relating to estuarine ecological receptors are covered separately (see Section 6.5).

6.4.2. This section provides a summary of baseline data collected to date and sets out the scope for the proposed assessment to be included in the ES.

Baseline Description

6.4.3. A desk study was carried out to identify the presence of any statutorily designated sites such as SACs, SPAs, Ramsar Sites, SSSI or National Nature Reserves (NNRs) within a radius of 15 km from the Site. This was done through consulting the Multi-Agency Geographical Information for the Countryside website[40] and by using the Joint Nature Conservation Committee[41] (JNCC) and Natural England designated site databases (e.g. Nature on the Map[42]).

6.4.4. A search was also carried out for 'Third Tier' sites, i.e. Sites of Nature Conservation Importance (SNCI), LWSs or LNRs and species data within a radius of 3 km of the Site and within 1 km of the Grid Connection Route. The search radius was reduced to 1 km for 'Third Tier' sites along the Grid Connection Route because it runs along a public highway in an urban area and impacts on sites/species greater than 1 km from the route are considered unlikely.

6.4.5. Species and local site data was sought and obtained from:

- Sefton MBC;
- Liverpool CC;
- Mersey Biobank (Local Biodiversity Records Centre covering Site and most of wider search area);
- Cheshire rECOrd (Local Biodiversity Records Centre covering part of wider search area to south);
- Lancashire County Bird Recorder; and
- Lancashire Wildlife Trust (LWT) (Covers Lancashire and North Merseyside).

6.4.6. A Phase 1 Habitat Survey was carried out in accordance with standard JNCC Phase 1 Habitat Survey methodology[43] on 28th April 2010 by David Pollard MIEEM. The survey area consisted of the Site, under consideration at that time[44]. Surrounding habitats within a buffer of 200 m were also identified (where accessible), although not mapped.

6.4.7. A survey for breeding birds, with specific attention paid to recording black redstart, was carried out in accordance with standard guidelines[45], [46]. This entailed five fortnightly visits to the Site, under consideration at that time, and immediately adjacent land (where accessible), alternating between dawn and dusk, between April and June 2010.

6.4.8. In summary, there are two SACs, five SPAs (one of which is a pSPA as well as a pRAMSAR) and fourteen SSSIs within 15 km, one LNR and four LWS within 3 km of the Site and/or within 1 km of the Grid Connection Route. Summary details are presented in Table 12 and site locations for statutory designations are illustrated in Figure 4 (except LWSs).

40 http://www.magic.gov.uk/ [accessed 07-12-10].
41 http://www.jncc.gov.uk/page-5332 [accessed 08-12-10].
42 http://www.natureonthemap.org.uk/ [accessed 17-12-10].
43 Joint Nature Conservation Committee, 2003. Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit, revised reprint.
44 Note that the Site Boundary has since been extended.
45 G Gilbert, DW Gibbons and J Evans (1998) "Bird Monitoring Methods – a manual of techniques for key UK species" BTO RSPB JNCC ITE and Seabird Group.
46 Bibby CJ, Burgess ND, Hill DA and Mustoe S (2000) "Bird Census Techniques" Academic Press/AC Black.

Table 12: Summary of designated Sites within 15 km of the Site

Designation	Site Name	Grid Reference	Distance (km) and direction from Site/Grid Connection Route	Summary of reasons for designation
Special Areas of Conservation (SAC)	Sefton Coast	SD281099	2.4 NW/2.9 NW	Primarily designated for Annex 1 dune habitats and Annex II Species petalwort. Great Crested Newt also present but not primary designation.
	Dee Estuary	SJ191819	14.0 WSW/ 14.5 WSW	Primarily designated for Annex 1 estuarine habitats – Other Annex 1 habitats present (dune and cliff habitats) but not primary reasons for designation. Annex II species present include sea and river lamprey and petalwort but these are not primary selection criteria.
Special Protection Areas (SPA) / Ramsar Sites	Ribble & Alt Estuaries	SD 375240	2.4 NW/ 2.9 NW	Designated for wintering Bewick's swan, whooper swan, pink-footed goose, shelduck, wigeon, pintail, teal, scaup, common scoter, cormorant, oystercatcher, lapwing, golden plover, grey plover, curlew, bar-tailed godwit, black-tailed godwit, redshank, knot, dunlin and sanderling. Also designated for breeding ruff, common tern, black-headed gull and lesser black backed gull and passage ringed plover, whimbrel, redshank and sanderling. Also designated for its seabird and waterfowl assemblages.
	Mersey Narrows and North Wirral Foreshore[47]	SJ 315 949	1.5 SW/ 2.0 SW	Proposed to be designated for wintering redshank and turnstone. Also proposed to be designated for its waterfowl assemblage.
	Mersey Estuary	SJ 440800	8.3 S/ 8.3 S	Designated for wintering great crested grebe, shelduck, teal, pintail, wigeon, golden plover, grey plover, lapwing, dunlin, curlew and redshank. Also designated for passage ringed plover and redshank.
	Dee Estuary	SJ191819	14.0 WSW/ 14.5 WSW	Designated for wintering shelduck, pintail, oystercatcher, bar-tailed godwit and redshank. Also designated for its waterfowl assemblage.
	Liverpool Bay	03 12' 34'' West 53 36' 10'' North	1.8 W / 2.3 W	Marine SPA designated for wintering red-throated diver and common scoter and its non-breeding waterfowl assemblage.

[47] Proposed Special Protection Area (pSPA) and Proposed Ramsar Site.

Designation	Site Name	Grid Reference	Distance (km) and direction from Site/Grid Connection Route	Summary of reasons for designation
Sites of Special Scientific Interest (SSSI)	Mersey Narrows	SJ 315 949	1.5 SW/ 2 SW	The Mersey Narrows is located at the mouth of the Mersey Estuary and comprises Seaforth on the north bank and Egremont Foreshore on the south. The two areas are separated by approximately 2 km, but considered to be an integral site on the basis of the constant interchange of bird populations. Whilst Egremont Foreshore is particularly important as a feeding site at low tide, Seaforth is particularly important as a high tide roost site, particularly during high spring tides when rocky shores and man-made structures closer to the feeding areas are submerged and not available as roosting sites.
	North Wirral Foreshore	SJ 250920	1.7 SW/ 2.2 SW	This is situated between the outer Dee and Mersey estuaries and is designated for its wintering and passage bird assemblages.
	Sefton Coast	SD 295 106	2.4 NW/ 2.9 NW	Sefton Coast is designated for dune, intertidal, sand and mud habitats. It is also recognised as an internationally important site for waterfowl. It also holds populations of sand lizard, natterjack toad and great crested newt.
	New Ferry	SJ 340 862	8.3 S/ 8.3 S	This site is notified for its large areas of intertidal sand, mudflats and other habitats, which support two nationally important species of wintering waterfowl, pintail and black-tailed godwit.
	Mersey Estuary	SJ 440 800	8.3 S/ 8.3 S	The Mersey Estuary is of international importance for waterfowl. It also exhibits a number of declining saltmarsh and other estuarine habitats.
	Meols Meadows	SJ 245 903	9.2 SW/ 9.7 SW	The main habitat is damp unimproved neutral grassland, the level fields being separated by ditches containing tall fen vegetation. This site is designated as the best example of the crested dog's-tail-common knapweed type of grassland known in Greater Manchester and Merseyside.
	Heswall Dales	SJ 261 821	14.3 SSW/ 14.5 SSW	This is the second largest lowland heath in Merseyside and is designated for this and the floral communities contained within.
	Downholland Moss	SD 324 084	12.1 N/ 12.1 N	Downholland Moss is a geological site and a key reference point for measuring sea level change in the northwest.
	Dibbinsdale	SJ 338 815	12.4 S/ 12.4 S	This is the largest area of ash-wych elm and alder woodland within Merseyside and as such it is designated for this and the floral communities contained within.
	Thurstaston Common	SJ 245 851	13.4 SSW/ 13.5 SSW	Thurstaston Common is the largest area of lowland heath in Merseyside and contains floral communities for wet heath, dry heath, acidic marshy grassland and birch/oak woodland.

Designation	Site Name	Grid Reference	Distance (km) and direction from Site/Grid Connection Route	Summary of reasons for designation
	Red Rocks		13.9 SW/ 14.4 SW	This site is designated as a typical example of a sand dune system and includes a large brackish dune slack with adjacent reedbed. The site is also noted for a small population of natterjack toads.
	Dee Estuary	SJ 220 800	14.0 WSW/ 14.5 WSW	The Dee Estuary is designated for its populations of internationally important wintering waterfowl; its populations of individual waterfowl and tern species whose numbers reach nationally and in some cases, internationally important levels; its intertidal mud and sandflats, saltmarsh and transitional habitats; the hard rocky sandstone cliffs of Hilbre Island and Middle Eye with their cliff vegetation and maritime heathland and grassland.
	The Dungeon	SJ 251 831	14.1 SSW/ 14.2 SSW	Geological SSSI designated for sedimentary siltstones and sandstone layers.
	Dee Cliffs	SJ 238 832	14.7 SSW/14.9 SSW	The site is designated primarily as the best known example of clay cliff and bank habitat in Merseyside with their associated plant communities, as well as some marl pits which have a rich flora and fauna and an area of herb-rich neutral grassland.
Locally Designated Sites within 3 km of Site or within 1 km of the Grid Connection Route				
Sefton Local Wildlife Sites (LWS)	Seaforth Nature Reserve	SJ318 971	2 NW/ 2.5 NW	Situated at the north end of the Liverpool/Bootle docks system this reserve consists of two pools one freshwater and the other saltwater and enclosed by an area consisting of overgrown rubble and debris. The reserve, which is contained within the docks system, is owned by MDHC and managed by Lancashire Wildlife Trust. The site is notable of its breeding and wading birds.
	Rimrose Valley and Canal	SJ 331 986	1.7 N/ 1.5 NW	Of significant nature conservation importance for the habitats and species that are present. Large areas of wetland and grasslands, e.g. Brookvale LNR and the Canal, are highly significant for breeding birds, dragonflies and extensive orchid displays.
Liverpool Local Wildlife Sites (LWS)	Leeds-Liverpool Canal	SJ 338 950	1.7 S/ 1.7 S	The site's habitat diversity, species rarity, species diversity and species naturalness are stated as reasons for its designation as a LWS. It is also likely that once survey resources are available water vole will be found on site, but that is still to be confirmed and we have been advised that a search for protected species at this site is necessary. The boundaries of the site also include adjacent open spaces.
	Melrose Cutting	SJ 344 935	1.8 SSE/1.5 E	The site's habitat rarity and diversity and its species rarity, diversity and naturalness are stated as reasons for its designation as a LWS.

Designation	Site Name	Grid Reference	Distance (km) and direction from Site/Grid Connection Route	Summary of reasons for designation
Local Nature Reserves (LNR)	Brook Vale	SJ 330 975	1.6 N/1.6 N	The Brook Vale LNR consists of a mosaic of several habitats including reedbed swamp, Rimrose Brook and a man-made pond system as well as smaller peripheral areas of damp meadow, dry grassland and willow carr woodland. All support the associated bird and invertebrate communities.

6.4.9. Existing terrestrial species data for the area within 3 km of the Site and/or 1 km of the Grid Connection Route are summarised in Table 13. This table is restricted to protected species (excluding records of Schedule 1 bird species outside the breeding season) and other species of conservation importance will be added to the ES at a later date. In addition, specific note was made by LWT to a colony of Kittiwakes which have nested on top of the seawall adjacent to the Site behind the extended 'splash wall' that should be considered in the impact assessment.

Table 13: Summary of protected or otherwise notable species records within 3 km of the Site or within 1 km of the Grid Connection Route

Grid Reference	Location	Species	Protection and Conservation Status[48 49 50]	Distance (km) and direction from Site/Grid Connection Route	Date	Source	Details
SJ315970	Seaforth Nature Reserve	Little Ringed Plover	Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)	2 NW/2 NW	2007	Mersey Biobank	1 proven record of breeding; 3 fledged young
SJ39D	Seaforth Nature Reserve	Black Redstart	Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); Amber List	2 NW/2 NW	1997 / 2009	Mersey Biobank / Lancashire Wildlife Trust	1 record of possible breeding
SJ3197	Seaforth Nature Reserve	Noctule Bat	European Protected Species under The Conservation of Habitats and Species Regulations 2010; Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); UK BAP; North Merseyside BAP (all bats)	2 NW/2 NW	2002/03	Mersey Biobank	6 individuals feeding
SJ39J; SJ346959	Leeds-Liverpool Canal	Water vole	Schedule 5 of Wildlife and Countryside Act 1981 (as amended); UK BAP, North Merseyside BAP	1.7 S/ 1.7 S	2001; 2009	Mersey Biobank	1 record of adult; 1 burrow
SJ344975	Litherland	Red Squirrel	Schedule 5 of Wildlife and Countryside Act 1981 (as amended); UK BAP; North Merseyside BAP	1.9 NE/1.7 N	2007	Mersey Biobank	1 record
SJ39H	Langton Dock	Roseate Tern	Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); Red List; UK BAP	0.2 S/0.4SW	2010	Lancashire Wildlife Trust	Proven Breeding

[48] Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 102, pp296–341.

[49] JNCC. UK Biodiversity Action Plan. http://jncc.defra.gov.uk/page-5717 [last accessed 27-01-12].

[50] Merseyside Biodiversity Group. North Merseyside Biodiversity Action Plan. http://www.merseysidebiodiversity.org.uk/index.asp?content=v2content\sap-review.xml [last accessed 27-01-12].

6.4.10. Within the area surveyed in 2010 there are a limited number of habitats. These are described briefly below and shown in the Phase 1 Habitat Map (Figure 5). Habitats present are:

- buildings;
- ephemeral/short perennial;
- tall ruderal;
- scrub;
- scattered tree(s);
- hard standing ('Tarmac' and gravel); and
- sea water (brackish).

6.4.11. The majority of the buildings within the Site comprise large warehouse style units primarily used for holding palm nuts (at the time of survey). They are large brick built structures with apex sloped roofs. Upon investigation there was no enclosed roof space and the buildings are open structures inside. The other buildings are two small flat roofed office buildings and a small brick structure with a single pitch sloping roof from within which the swing bridge is operated. All the buildings are judged from Bat Conservation Trust (BCT) guidelines[51] to be of very low/low potential for bats. The smaller buildings do not appear to provide any access points and cavities within the brickwork and rendering. The large warehouses contain no roof voids and only occasional loose bricks or holes in the mortar, none of which exhibit any signs of use by bats.

6.4.12. Interspersed along the edges of the buildings and hard standing are small areas of ephemeral/short perennial type vegetation. Within these areas various plant species were noted. These include: coltsfoot (*Tussilago farfara*), mugwort (*Artemisia vulgaris*), hairy bittercress (*Cardamine hirsuta*), ragwort (*Senecio jacobea*), ribwort plantain (*Plantago lanceolata*) red clover (*Trifolium pratense*) and bird's foot trefoil (*Lotus corniculatus*). These areas are all very small and as such offer very limited potential for invertebrates which favour old 'brownfield' sites such as dingy skipper (*Erynnis tages*). These areas are also considered too small and scattered to qualify as the UK BAP priority habitat "open mosaic habitat on previously developed land".

6.4.13. The hard standing is either 'Tarmac' and used as a car/lorry park or limestone gravel and used for car storage.

6.4.14. The vegetated mound at the west end of the Site supported ephemeral species as listed above and tall ruderal vegetation including; bramble (*Rubus fruiticosa* agg.), spear thistle (*Cirsium vulgare*), creeping thistle (*Cirsium arvense*), groundsel (*Senecio vulgaris*), buddleia (*Buddleja davidii*), broad leaved dock (*Rumex obtusifolium*), common vetch (*Vicia sativa*) and hedge bindweed (*Calystegia sepium*). Along the edge of the habitat there are four small willow trees (*Salix* sp.) and two small sycamore trees (*Acer pseudoplatanus*).

6.4.15. In the wider area i.e. within circa 200 m of the area mapped, there are areas of open water (docks) to the west and south and hardstanding and patches of ephemeral/short perennial vegetation to the north. The vegetated area alongside the freight railway line, to the east of the Site, is botanically similar to the areas of ephemeral/short perennial vegetation described previously. There is also one small area dominated by bramble and elder (*Sambucus nigra*) scrub.

6.4.16. The breeding bird / black redstart survey will be fully reported in a stand-alone baseline report which will be appended to ES. A brief summary of key findings is provided below.

6.4.17. Black redstart was not heard or seen within the area surveyed during the bird surveys. On the 3rd June 2010 a male black redstart was heard singing some distance (500 m +) from the Site in a south easterly direction. Unfortunately the singing bird could not be located, despite searching and it was not heard again throughout the remaining surveys.

[51] Bat Conservation Trust (2007). "Bat Surveys – Good Practice Guidelines". Bat Conservation Trust, London.

6.4.18. A total of 15 other bird species were recorded during the bird survey, of which ten species were either confirmed, probable or possible breeders. These species were; mallard, ringed plover, lesser black backed gull, herring gull, pied wagtail, dunnock, blackbird, starling, linnet and feral pigeon.

6.4.19. Based on the habitats present, the area surveyed was not considered likely to support significant numbers of non-breeding waterfowl species associated with nearby SPAs. Similarly, given the Site location, set back from the Mersey Estuary, the area surveyed is not considered likely to be located on a regular flight route for SPA waterfowl species.

6.4.20. During the execution of the bird and habitat surveys incidental recording of other wildlife species took place. This included a high flying (at least 50 m) noctule bat noted on 16th June 2010 flying south over the survey area and subsequently continuing at the same height over the Mersey Estuary until lost from view.

6.4.21. The potential for the area surveyed to support other protected/notable terrestrial species, e.g. otter was investigated during the habitat survey. There were no field signs or potentially suitable habitat for any such species.

Assessment Methodology

6.4.22. Given that the Indicative Red Line Boundary has been modified, to include additional land in the western area of the site, since the original surveys in 2010, it is proposed to undertake an update extended Phase 1 habitat survey and an updated breeding bird / black redstart survey in spring/summer 2012, following similar methodologies to those employed in 2010. These surveys will cover all terrestrial habitats within the Indicative Red Line Boundary with the exception of the Grid Connection Route. Given that the Grid Connection Route is located entirely within the public highway, within an urban area and given the nature of the proposed works, surveys of the Grid Connection Route are not considered necessary.

6.4.23. At this stage, on the basis of data obtained to date, no further surveys are considered likely to be required. This will be reviewed following the updated extended Phase 1 habitat survey.

6.4.24. The impact assessment will be undertaken with reference to the 'Guidelines for the Ecological Impact Assessment in the UK'[52] produced by the Institute of Ecology & Environmental Management (IEEM). The impact assessment will include assessment of impacts relating to demolition, construction, operation and decommissioning.

Assessment Criteria

6.4.25. In accordance with the IEEM guidelines a significant impact, in ecological terms, is defined as 'an impact (adverse or positive) on the integrity[53] of a defined site or ecosystem/ecosystems and/or the conservation status[54] of habitats or species within a given geographical area, including cumulative impacts.'

6.4.26. The approach adopted here aims to determine an impact to be significant or not on the basis of a discussion of the factors that characterise it, i.e. the ecological significance of an impact is not dependent on the value of the feature in question. The value of a feature that will be significantly affected is used to determine the geographical scale at which the impact is significant, e.g. an ecologically significant impact on a feature of regional importance would be considered to represent a significant impact at a regional level. This in turn is used to determine the implications in terms of legislation, policy and /or development control.

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52 Institute of Ecology & Environmental Management, 2006, Guidelines for Ecological Impact Assessment in the United Kingdom.

53 In accordance with the Office of the Deputy Prime Minister (2005) Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system' integrity is defined as follows: "The integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it has been classified".

54 Conservation status, based on the Habitats Directive, is defined as follows: "for habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long term distribution, structure and functions as well as the long term survival or its typical species within a given geographical area; and for species, conservation status is determined by the sum of the influences acting upon the species concerned that may affect the long term distribution and abundance of its populations within a given geographical area".

6.4.27. Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

6.4.28. In accordance with the IEEM guidelines the initial action for any assessment of impacts is to determine which features should be subject to detailed assessment. Ecological receptors to be the subject of more detailed assessment should be of sufficient value that impacts upon them may be significant in terms of either legislation or policy. For this assessment impacts will only be assessed in detail for terrestrial ecological receptors of at least local value or otherwise subject to some form of legal protection.

6.4.29. The presence of breeding ringed plover is notable and potential impacts will need to be assessed in detail for this species. At this stage no other terrestrial ecological receptors of local value or greater are considered likely to be directly affected by theProject, although this will be reviewed following the updated surveys outlined above.

6.4.30. Due to the Site's proximity to a number of Natura 2000 sites (SACs and SPAs), it will be necessary for the SoS, as the competent authority with respect to the Conservation of Habitats and Species Regulations 2010, to consider the need for an Appropriate Assessment, particularly with respect to possible changes in acid and nitrogen deposition (see Section 6.2). It is the intention of RES, after the submission of this ESR, to provide the PINS and other prescribed consultees with a screening document, based on data collected and reviewed to date, which will enable the PINS to make an informed decision on the need for Appropriate Assessment.

Potential Mitigation Measures

6.4.31. Following the assessment of potential impacts, measures to avoid any significant adverse impacts, or reduce them to acceptable levels, will be developed as appropriate.

6.5. Estuarine Ecology

Overview

6.5.1. This section will address the estuarine ecology impacts of cooling water abstraction and discharge during operation, demolition and construction, and decommissioning of the cooling water infrastructure, including the impacts on designated wildlife sites. Impacts examined will include, but not be limited to, the impingement and entrainment of fish and other marine life, the general effects of thermal discharges and associated biocides, estuarine noise issues, and site disturbance effects leading to polluted runoff entering the Mersey Estuary.

6.5.2. The Site is situated close to the mouth of the Mersey Estuary, on the eastern side of Liverpool Bay. It is currently intended to abstract cooling water from the Mersey Estuary for once-through cooling. This water would be returned to the Mersey Estuary some 8 to 10°C warmer. The impacts of this will be assessed through thermal plume modelling and in consultation with consultees, such as the EA and MMO.

6.5.3. The majority (80%) of fuel for the Project will be brought to Site by ship through Alexandra Branch Dock No. 3. Ship movements form part of the existing operational activities undertaken by the Port of Liverpool and are, therefore, not subject to assessment further in the EIA.

The necessary Grid Connection Routes will not impact on the estuarine environment.

Baseline Description

6.5.4. Areas around the Mersey Estuary and the adjacent Liverpool Bay are covered by a variety of wildlife and habitat designations, including Ramsar, SSSI, SAC, SPA, and Important Bird Areas (refer to Section 6.4). There are also recommended Marine Conservation Zones (rMCZ) nearby at Sefton coast and the Hilbre Island group. None of these designations actually covers the Site or other components within the Indicative Red Line boundary. However, the Mersey Narrows SSSI and Mersey Estuary Important Bird Area lie on the opposite bank of the estuary, approximately 1.8 km from the Site. The other designated areas lie within 2 – 5 km of the Site. The Site is also covered by the North Merseyside Local Biodiversity Action Plan (LBAP) area. Other wildlife and habitat designations within 10 km of the Site will be considered.

6.5.5. The estuary supports a diverse fish community including resident, marine migrant, nursery-using and over-wintering species, as well as those undertaking diadromous migrations through the estuary. It acts as an important migration route for both river lamprey and sea lamprey between coastal waters and their spawning areas. In addition, salmon and sea trout migrate up the river, although they are not as numerous as in the past. Other fish, such as twaite shad, smelt and flounder, move up into the estuary to feed, and it provides important nurseries for North Sea fish populations.

6.5.6. Biodiversity Action Plan (BAP)[55] and any species related to Annex II habitats within the area will be assessed. Species occurring on the national BAP 2007 species list, although not the North Merseyside Local BAP list, recorded within the estuary include the eel, *Anguilla anguilla* and the harbour porpoise, *Phocoena phocoena*. Three BAP marine bird species, scaup, *Aythya marila*, common scoter, *Melanitta nigra* and curlew, *Numenius arquata* were recorded within 1 – 2 km of the Site between 1988 and 2000. Marine mammals recorded within the 10 km grid square SJ39 include sei whale, *Balaenoptera borealis*, common dolphin, *Delphinus delphis*, long-finned pilot whale, *Globicephala melas* and bottle-nosed dolphin, *Tursiops truncatus*.

Assessment Methodology

6.5.7. The methodology for the EIA will include a desk study comprising a literature review and internet search for information relating to the Site. The main data sources include the following web sites:

- MAGIC (www.magic.gov.uk);
- NE site (www.naturalengland.org.uk);
- NBN Gateway (www.searchnbn.net);
- EA (www.environment-agency.gov.uk);
- Irish sea conservation zones (www.irishseaconservation.org.uk);
- Mersey BioBank (www.merseysidebiobank.org.uk);
- LWT for Lancashire, Manchester and North Merseyside (www.Lancswt.org.uk); and
- Pisces Conservation Ltd (www.pisces-conservation.com).

6.5.8. The withdrawal of water from the Mersey Estuary is likely to result in the impingement and entrainment of fish, crustaceans and other macroinvertebrates. Where applicable the impact of impingement arising from the abstraction of cooling water will be assessed using PISCES (the Prediction of Inshore Saline Community by Expert System) software. This software estimates the likely community structure and possible impact of the cooling water abstraction, and the results are compared to known data sets for the region. Impacts on the various life stages that could be affected will be considered.

6.5.9. Entrainment will be assessed by using data from previous studies at other estuaries, and the known presence of plankton in the Mersey Estuary.

6.5.10. The Mersey Estuary and the inshore areas of Liverpool Bay are of particular importance as a nursery area for many fish and shellfish species. Impacts on these populations will be assessed.

[55] Data extracted from National Biodiversity Network Gateway: http://data.nbn.org.uk/index_homepage/index.jsp.

6.5.11. The antifouling used to protect the cooling water systems will be reviewed and its impacts assessed. The residual oxidant (normally chlorine) content of the effluent due to dosing with biocide is expected to dissipate significantly before discharge from the cooling water outfall, due to the chlorine demand of seawater (When chlorine, dosed as sodium hypochlorite solution, is added to seawater there is an instantaneous chlorine demand and this will result in the rapid consumption of any free chlorine in the discharge as the water is mixed. The final end product of chlorination is the production of bromoform (produced by the displacement of bromine already in the sea water by the more reactive chlorine) in low concentrations (Davis and Coughlan 1983[56]). The impact of the use of biocides will be assessed on the basis of previous research. Particular consideration will be given to the shellfisheries of the Wirral and Crosby area. Interactions with other discharges nearby will be reviewed such as the nearby sewage treatment works managed by United Utilities.

6.5.12. An assessment of the need of any further modelling to be undertaken for the thermal plume will be made. Modelling will be undertaken using CORMIX, a standard thermal plume model.

6.5.13. For the habitat features likely to be impacted by thermal effluents and biocide use, a survey involving benthic sampling would be undertaken to characterise potentially affected areas and inform an assessment of likely impact. The extent of these surveys will be agreed with Natural England. The once-though cooling with water taken and returned to the estuary will not impact the dock. The construction required to create the intake and outfall pipes will be undertaken by directional drilling, so will not directly affect the dock. The impact will only be at the point of the intake and outfall infrastructure located on the bed of the estuary, which in itself will be minimised by the use of directional drilling.

6.5.14. The potential for the introduction of alien species from the increased ship movements will be considered.

6.5.15. Construction and decommissioning activities in the vicinity of the site that may impact on the aquatic ecology, including noise, will be assessed in terms of the potential impact on the aquatic life, using data from previous studies in the Mersey and other estuaries.

Assessment Criteria

6.5.16. As stated in the IEEM guidelines[57], the starting point for any assessment of impacts is to determine which ecological receptors should be subject to detailed assessment. In order to warrant detailed assessment, ecological receptors should be of sufficient value that impacts upon them may be significant (in terms of legislation or policy) and be potentially vulnerable to significant impacts arising from the development. This approach is consistent with the EIA Regulations, which only require investigation of likely significant effects.

6.5.17. In this assessment, an ecologically significant impact is defined as an impact (adverse or positive) on the integrity of the site or ecosystem(s) and/or the conservation status of habitats or species within the identified zone of impact for the development. The definitions of 'integrity' and 'conservation status' used for this assessment are those detailed in the Habitats Directive and reproduced in the IEEM Guidelines, namely:

- integrity is the coherence of ecological structure and function, across a site's whole area, that enables it to sustain a habitat, complex of habitats and/or the levels of populations of species; and
- conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

[56] Davis and Coughlan, (1983). Model for predicting chlorine concentration within marine cooling circuits and its dissipation at outfalls. Ann Arbor Science, Ann Arbor, MI. 1983. p 347-257.

[57] Institute of Ecology & Environmental Management, 2006, Guidelines for Ecological Impact Assessment in the United Kingdom.

6.5.18. It is important to note that even where an impact on the integrity or conservation status of a habitat or species is not significant, it could still result in an offence under the law, e.g. in relation to disturbance of a protected species. The intake screening options with be reviewed in light of the eel regulations.

6.5.19. The importance of an ecologically significant impact corresponds to the importance of the ecological receptor involved. For example, an impact on a feature of national importance is significant at the national level and therefore a greater issue in policy terms compared to an ecologically significant impact on a feature of county or local importance. It is important to note, however, that any impact, which has been found not to be significant at the level at which a receptor has been valued, could be significant at a more local level, in which case it should not be ignored.

Potential Mitigation Measures

6.5.20. Design and positioning of the intake can mitigate much of the impact on estuarine ecology of the abstraction of water for cooling. The impact can be further reduced by limiting the movement of estuarine fauna into the intake system by the use of technologies such as wedge wire screens. Thermal effects will be minimised by careful positioning of the outfall and efficiently mixing the discharge with the receiving water using a diffuser. EA guidance regarding the design of the intake and outfall will be followed[58].

6.6. Hydrology, Geology and Soils

Overview

6.6.1. The effects of the Project on the hydrological, hydrogeological and geological environment at the Site will be evaluated to ascertain the likelihood of the development causing impacts to soils, geology, surface water and groundwater.

6.6.2. The assessment will be desk based supported by site visits and information from preliminary ground investigations. Please see paras. 6.6.13. to 6.6.19. for further information.

Baseline Description

6.6.3. The Site is close to linked surface water features on three sides, which form part of the Port of Liverpool impounded dock system. To the south of the Site is Alexandra Branch Dock No.3; to the west of the Site is Hornby Passage with Gladstone River Entrance Lock and the Mersey Estuary beyond; and to the North of the Site, 250 m beyond the Site boundary, is Gladstone Branch Dock No.1.

6.6.4. The Project extends north east from the Site inland to Bootle Grid Substation to accommodate the grid connection. Assessment of the Project in terms of hydrology, geology and soils will include the grid connection corridor, however it is anticipated that potential impact from works within the grid connection corridor are likely to be not significant (see para. 6.6.20 to 6.6.24 for definition of term ‘significance’ in relation to hydrology impact).

6.6.5. Water levels in the impounded dock system are maintained at approximately Mean High Water Spring (MHWS), meaning that on the majority of tide cycles the water level within the dock system is higher than in the adjacent Mersey Estuary. These levels are achieved through operation of two pumping stations to pump water into the dock system during high tide conditions. Water levels exceeding nominal dock levels within the Mersey Estuary are referred to as restoring tides and these tides are used to naturally replenish the water level within the dock system.

6.6.6. The Site is occupied by a mix of industrial uses on land predominantly covered by impermeable surfaces, some of which is served by existing surface water drainage systems.

[58] Environment Agency 2005. Screening for Intake and Outfalls: a best practice guide: Science Report SC030231.

6.6.7. Floodplain mapping detailed on the Environment Agency web-based indicative flood maps shows the Site to be outside the areas of risk from fluvial and tidal sources. The indicative floodplain mapping does not take account of any flood defences which may be in place along the estuary and does not account for risk following potential changes to the hydrological cycle or tidal conditions due to climate change. This area of the Port of Liverpool is not known to have flooded historically.

6.6.8. The Site is generally underlain by alluvial deposits associated with the course of the Mersey Estuary. Alluvium typically comprises silt and sand deposits, with subordinate gravel, clay and peat horizons. The northern area of the Site is situated over the former Hornby Dock which was infilled during the early 1990s. Infilling of the dock was achieved as a registered landfill for inert waste. The Alluvium and landfill deposits are underlain by solid geology comprising Sherwood Sandstone bedrock from the late Permian to mid-Triassic era. This formation consists of red, yellow and brown sandstone; and is part pebbly with subordinate red mudstone and siltstone. The sandstone is designated by the Environment Agency as a Principal Aquifer with high intergranular and/or fracture permeability.

6.6.9. The Desk Study states that there are no licensed abstractions or water uses within 500 m of the Site, however the area is underlain by a Principal Aquifer. A Principal Aquifer is defined as bedrock deposits with high intergranular and/or fracture permeability, usually providing a high level of water storage which may support water supply and/or river base flow on a strategic scale.

6.6.10. Groundwater levels on the Site are likely to be relatively stable because of the Site's position within the Port of Liverpool impounded dock system. Any increase in water levels within the dock, through extreme tidal conditions or excessive rainfall may have the potential to cause a corresponding increase in groundwater levels.

6.6.11. Potential sources of existing contamination include sources from current industrial land uses, neighbouring land uses and historical activities. The current and past use of the Site and immediate surroundings includes:

- dock and cargo handling and storage area;
- inert landfill;
- railway land;
- coal storage area;
- CHP plant;
- electrical substation;
- vehicle storage; and
- lorry and container park.

6.6.12. The potential environmental impacts relating to hydrology, geology and soils associated with the demolition and construction phase, operational phase and decommissioning phase of the Project have been initially identified as:

- the impact of discharging cooling water and other process effluents;
- the generation of sediments and short term pollution risk during the construction of the intake and outfall structures in the Mersey Estuary;
- potential for human health risks if contaminated materials are encountered on Site;
- potential interactions between ecology and hydrology;
- impacts of the development in relation to flooding issues; and
- release/disturbance of contaminants from soil, leading to potential changes to water quality.

Assessment Methodology

6.6.13. The environmental assessment of impacts upon water and soils will be based on the Institute of Environmental Management and Assessment (IEMA) guidance. The EIA team will also provide impact assessment criteria based on this guidance and that provided by the EA in their Groundwater Protection Policy and Practice document[59] for assessing impacts on the water and soils environment. This is based on defining the baseline sensitivity of the water and soils environment and determining criteria for impact magnitude relating to a range of water and soil processes.

6.6.14. The assessment will be based on site visits and investigations, a desk-based data collection exercise and consultation with the Environment Agency, Sefton MBC, Liverpool CC, Wirral BC and the Association of Port Health Authorities. Data will be collected from a wide range of sources, including the following as appropriate:

- topographical survey mapping;
- Environment Agency, with respect to water quality, groundwater levels, abstractions, discharges and landfill sites in the area;
- aerial photographs;
- British Geological Survey (BGS) maps and borehole logs;
- Ordnance Survey Historical mapping;
- information from the Mersey Port Health Authority (MPHA); and
- information from local authority Environmental Health and Planning Departments.

6.6.15. The Desk Study[60] for this Site contains details on ground conditions and the contamination status of the area, which will be reviewed as part of this assessment. In addition, Sefton MBC has noted during consultation that, there is the potential that tin slag was used for historical infilling of the dock. The tin smelting process concentrates naturally occurring radionuclides in the process raw materials to a level at which the material may present an occupational risk to those working on contaminated sites and a significant risk to persons occupying buildings constructed on such a site. A Radiological Protection Supervisor will be in attendance during the site investigation works to screen surface arisings. In the event that any suspect materials are identified, a designated Radiological Protection Advisor (RPA) will be consulted for further advice. The relevant findings of the site investigation will be included as part of the ES.

6.6.16. A Marine Licence, issued by the MMO, for in-channel works will be required for the construction and operation of the intake and outfall structures. Permits for abstraction and discharge of water from the Mersey Estuary will also be integral to the Marine Licence. The Marine Licence will form part of the DCO application, and the DCO will grant the Marine Licence as an associated consent. As part of the requirements for the Marine Licence, this assessment will consider impacts on the Mersey Estuary.

6.6.17. The impact of the discharge of cooling water and process effluents will be assessed with respect to the aquatic ecology of the Mersey Estuary as described in Section 6.5.

6.6.18. The assessment will also consider the impacts of the construction of the intake and outfall structures on the bed of the Mersey Estuary. This will include a consideration of impacts such as those arising from the construction works, the risks posed through the use of concrete in providing the necessary footings and risks associated with oil and fuel used by plant during the construction phase. It is intended to provide a series of method statements which will outline how the construction of the intake and outfall will comply with best practice and the requirements of the MMO.

[59] Underground, Under Threat, Groundwater protection: policy and practice (GP3), Environment Agency, 2006.
[60] Geotechnical and Geo-Environmental Desk Study, Royal Haskoning, September 2010.

6.6.19. To complement the assessment, a FRA will be undertaken to assess the impacts of the Project on flooding at the Site and its surroundings. This will be undertaken in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25)[61]. The assessment will take into consideration existing peak water level information for the River Mersey, and will predict likely changes due to climate change. This will provide the basis for considering flood mitigation measures, if required. The scope of the FRA will be agreed with the Environment Agency but is likely to include assessment of peak water levels from fluvial and tidal sources during extreme events and potential impact of wave action on the Project during storm surge conditions.

Assessment Criteria

6.6.20. There are no published guidelines or criteria for assessing and evaluating effects on hydrology, hydrogeology, geology or soil within the context of an EIA. The assessment will be based on a methodology derived from IEMA[62] guidance. The evaluation will also be based on EA guidance within their Pollution Prevention Guidance documentation (GP3, 2007). The methodology sets a list of criteria for evaluating the environmental effects, as follows:

- the type of effect (i.e. whether it is positive, negative, neutral or uncertain);
- the probability of the effect occurring based on the scale of certain, likely, or unlikely;
- the policy importance of the resource under consideration in a geographical context (i.e. international, national, regional or local), and the sensitivity of the receptor on a scale of low to high, defined within Table 14; and
- the magnitude of the effect in relation to the resource that has been evaluated, quantified using the scale high, medium, low or negligible, defined within Table 15.

Table 14: Definitions of Policy Importance and Sensitivity: Water and Soil

Importance and Sensitivity Context	Water and soil definition
International and/or High	Important on a European or global level e.g. RAMSAR Sites, Habitats Directive Sites
National and/or High	Important in England e.g. SSSIs. Public water supplies and highly productive aquifers. Local water supplies, including private water supplies where there is no alternative to private supplies.
Regional and/or Medium	Important in the context of the region; e.g. catchment scale issues. Private water supplies, located within vicinity of mains water supply. Private water supplies used only for agricultural purposes and not drinking water.
District and/or Medium	Important in the context of the local district e.g. locally important aquifers.
Local and/or Low	Important within watersheds to which the site may drain; within the site and immediate vicinity e.g. non-aquifer and minor watercourses.

[61] Planning Policy Statement 25: Development and Flood Risk, DCLG, March 2010.
[62] The Institute of Environmental Management and Assessment (IEMA) is the professional membership body for promoting best practice standards in environmental management, auditing and assessment for all industry sectors.

Table 15: Impact Magnitude Criteria

Magnitude of effect	Runoff regime	Surface water quality	Water Supply	Riverine flow Regime	Riverine Morphology	Groundwater Levels	Groundwater Quality	Geological Changes	Soil Quality
High	Change (>50%) in proportion of site rainfall immediately running off, changing surface water flows, flood risk or erosion potential	Change in water quality, changing water quality status with respect to EQS[63] for more than one month	Change in the quality of the supply with respect to DWS[64]; Change in the flow of supply leading to reduction in water pressure and loss of supply	Change in flows of >5% resulting in a measurable change in dilution capacity or flood risk	Changes in erosion and deposition, with conservation interests put at risk	Change in groundwater levels leading to an identifiable change in groundwater flow regime and artesian flow, affecting water supplies	Change in groundwater quality, changing site quality with respect to DWS for more than 1% of samples	Disturbance or loss of cited features of geological Sites of Special Scientific Interest (SSSI) such that the integrity of the designation is harmed	Disturbance of soil with contamination exceeding calculated Tier 2 Site Specific Target Levels (SSTLs) and thus requiring remedial action
Medium	Change (10-50%) in proportion of site rainfall immediately running off, changing flood risk or erosion potential	Change in water quality, changing site status with respect to EQS for less than one month	Measureable change in the quality of the supply for less than 1% of samples with respect to DWS; Temporary discolouration and elevated sediment content.	Change in flows between 2-5% resulting in a measurable change in dilution capacity and flood risk	Some change in deposition and erosion regimes	Change in groundwater levels leading to an identifiable change in groundwater flow regime. Measurable change in flow to water supplies and base flows	Change in groundwater quality, changing site quality with respect to DWS for less than 1% of samples	Some disturbance or loss to cited geological features of SSSIs but no harm to the integrity of the designation	Disturbance of soil with contamination exceeding Tier 1 generic screening levels but not exceeding Tier 2 SSTLs

[63] EQS – Environmental Quality Standard, as laid down in relevant EU Directives and national legislation.
[64] DWS – Drinking Water Standards.

Magnitude of effect	Runoff regime	Surface water quality	Water Supply	Riverine flow Regime	Riverine Morphology	Groundwater Levels	Groundwater Quality	Geological Changes	Soil Quality
Low	Change (<10%) in proportion of site rainfall immediately running off, but no change to flood risk or erosion potential	Measurable change in water quality but no change with respect to EQS	Measurable change in water quality, but no change with respect DWS. No change in pressure or flow	Measurable change in river flows of <2%, but no change in flood risk	Slight change in bed morphology and sedimentation pattern. Minor rates of erosion	Measurable change in groundwater levels, though no appreciable change in groundwater flow regime	Measurable change in groundwater quality, but not changing status with regards to DWS	No disturbance or loss to SSSIs	Disturbance of soil with measurable contamination but not exceeding Tier 1 generic screening guideline values
Negligible	No measureable change in proportion of site rainfall immediately running off, and no change in flood risk or erosion potential	No measurable change in water quality and no change with respect to EQS	No measurable change in water quality and no change with respect to DWS. No change in pressure or flow	No measurable change in river flows and no change in flood risk	No measurable change in bed morphology and sedimentation patter. No erosion	No measurable change in groundwater levels and no appreciable change in groundwater flow regime	No measurable change in groundwater quality and no change in status with regards to DWS	No disturbance or loss to SSSIs	No disturbance of soil with no measurable contamination

6.6.21. Professional judgement will be used to assess the findings in relation to each of these criteria to give an assessment of significance for each effect. Effects will be considered to be of Major, Minor, or no significance. As a guide, a significance table has been developed whereby the combination of sensitivity and magnitude give the significance of the effect (Table 15). In some circumstances, it may not be possible to apply a simple sensitivity and magnitude level to an effect as there may be many variables that influence its significance. In such cases a full description of the reasoning behind the evaluation will be given. Where an effect is deemed to be Major or Minor, this will be defined as significant in the context of the EIA regulations.

Table 16: Impact Magnitude Criteria:

Sensitivity of impact	Magnitude of effect		
	Low	Medium	High
International / High	Minor / Major	Major	Major
National/ High	Minor / Major	Major	Major
Regional/ Medium	Minor	Minor / Major	Major
District/ Medium	Not significant / Minor	Minor / Major	Minor / Major
Local/ Low	Not significant	Minor	Minor / Major

Potential Mitigation Measures

6.6.22. The design of any mitigation measures will be based on relevant guidance and appropriate advice provided by the Environment Agency and others, such as the Construction Industry Research and Information Association (CIRIA). It is expected that many mitigation measures will be implemented through the appropriate design of the development and layout modifications following consultations with the Environment Agency and other key stakeholders.

6.6.23. The following mitigation measures are expected to be considered for the protection of surface water and groundwater quality throughout demolition and construction, and operation:

- adoption of best practice pollution prevention control measures, including:
- impermeable surfacing and small bunds around potentially polluting activities;
- designated areas for fuel storage and refuelling; and
- Environmental Management Method Statements (EMMS) for contractors working on-site.
- appropriate design of foundation installations taking into account the management of soils and soil water and the possibility of encountering shallow groundwater. This will be based on statutory guidance;
- appropriate design of intake and outfall structures, taking into account potential impacts from construction or operational activities;
- compliance with statutory guidance with respect to the handling of soils for earthworks activities and formation of foundation excavations;
- piling works to be undertaken with reference to statutory guidance and, if necessary, a piling risk assessment shall be undertaken;
- any stockpiling of soil to be kept away from watercourses and set back from the edge of dock walls, and measures to be included to minimise surface water runoff;
- demolition and construction workers to be made aware of any risks with appropriate personal protective equipment and hygiene facilities being provided; and
- management of demolition and construction traffic to minimise creation of fugitive dust.

6.6.24. In addition, there may be a need for mitigation measures to combat the risks associated with flooding. Such measures will focus on the need for flood protection, health and safety aspects of flood risk and the incorporation of flood resilience measures.

6.6.25. Specific mitigation approaches may also be needed in the form of appropriate method statements, to describe any works to the bed of the Mersey Estuary associated with the installation of the cooling water intake and outfall structures.

6.7. Landscape and Visual

Overview

6.7.1. The landscape and visual assessment, in the form of a Townscape and Visual Impact Assessment (TVIA), will consider the change to the prevailing landscape and townscape character and visual amenity of the Site and surrounding area as a result of the Project. This section sets out the anticipated scope of the future TVIA and summarises the existing baseline landscape, townscape and visual conditions both at the Site and within a study area of a 5 km radius. The extent of the study area is considered appropriate to the nature and size of the proposal within a townscape setting and was agreed through initial consultation with Sefton MBC between January and March 2011. Comment was also requested from Wirral BC and Liverpool CC.

Baseline Description

Site Context

6.7.2. The Port of Liverpool is a working port dominated by large scale industrial buildings and warehousing and includes a container port 1.1 km to the north of the Site, passenger ferry terminal 700 m to the south and two wind farms: the four turbine Port of Liverpool Wind Farm approximately 800 m south west of the Site, located along the dock wall between Alexandra and Huskisson docks, and the six turbine Seaforth Wind Farm located approximately 950 m north west of the Site on Royal Seaforth dock wall, adjacent to Crosby beach.

6.7.3. The area of land to the east of the study area and the Mersey Estuary is urban in character forming part of the greater Liverpool conurbation. The land is generally low lying and flat with typically estuarine characteristics.

6.7.4. Beyond the Port of Liverpool to the east lies the town of Bootle which comprises a mixture of 19th and 20th century commercial and residential properties. To the north lies the coastal town of Crosby which is built behind a broad sandy beach whilst to the south lies Liverpool city centre, with numerous historic buildings including the World Heritage Site (WHS) of the regenerated Albert Docks.

6.7.5. To the west of the study area and the Mersey Estuary, lies the Wirral peninsula and the town of Wallasey, a former Victorian resort and a mostly 19th and 20th century residential area which is dominated by broad open views across the mouth of the Mersey. The Port of Liverpool is clearly visible across the river on the eastern bank from riverside locations.

Townscape Character

6.7.6. The Project lies within the 'Merseyside Conurbation' National Character Area 58 as defined by the National Countryside Character classification (Countryside Commission, Countryside Character: Vol 2 North West)[65]. The Merseyside Conurbation National Character Area has a predominantly urban character. Open countryside within the urban fabric of the Merseyside conurbation is limited and restricted to isolated pockets. The Leeds and Liverpool Canal and railway network form important green corridors through the urban landscape. A sandstone ridge runs north-west to south-east through the Wirral peninsula and forms a natural edge to this landscape character area. From this ridge westwards the landscape is more wooded and rural.

6.7.7. Other local landscape character assessments which partially cover the study area include the Landscape Character Assessment of Sefton (Sefton MBC 2003)[66], Wirral Landscape Character Assessment (Wirral BC 2009)[67] and a townscape study of the Liverpool Maritime Mercantile City World Heritage Site (WHS) (Liverpool CC 2009)[68].

[65] National Countryside Character classification, Countryside Commission, Countryside Character: Vol 2 North West.
[66] Sefton MBC, Supplementary planning guidance note 2003 : Landscape Character Assessment of Sefton. 2003, Sefton Council.
[67] TEP, Wirral Landscape Character Assessment and Visual Appraisal. 2009, Wirral BC.
[68] Liverpool CC, Supplementary Planning Document: Liverpool Maritime Mercantile City World Heritage Site. 2009, Liverpool CC.

Landscape/Townscape Policy Context

6.7.8. There are no national landscape designations covering the Site or the study area. The Sefton Green Belt is located to the north of the site within the study area. The potential impacts upon the Green Belt will be assessed.

Visual Assessment

Assessment Methodology

6.7.9. The TVIA will examine the potential impacts of the Project on the landscape, townscape and visual amenity of the agreed study area. It will be based on relevant and accepted guidance, and will draw on information provided by statutory consultees, current landscape planning policies and other relevant documentation, computer based visibility analysis and fieldwork observations.

6.7.10. The TVIA methodology will be based on the guidance given in the following documents:

- Landscape Character Assessment: Guidance for England and Scotland (The Countryside Agency and SNH, 2002); and
- Guidelines for Landscape and Visual Assessment (Landscape Institute and Institute of Environmental Assessment 1995 and 2nd Edition 2002).

6.7.11. Relevant national and local planning policy and guidelines relating to landscape, townscape and visual impact will also be reviewed to set the context for the analysis.

6.7.12. Following the Landscape Institute's Guidelines, landscape/townscape impacts derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced as a result of the proposed development. Visual impacts relate to changes in the available views of the landscape and are therefore impacts on people and their perceptions.

6.7.13. Our approach to the TVIA includes the following key tasks:

- data collection (desk study and field survey);
- description of baseline conditions;
- design and mitigation;
- assessment of landscape and visual effects, including significance of impacts; and,
- reporting.

6.7.14. The TVIA will concentrate on a 5 km radius study area to establish the baseline landscape, townscape and visual conditions, and examine the sensitivity of the landscape/townscape and visual receptors to change.

6.7.15. A combination of desk study, field survey, analysis and reporting will be used to describe, classify and evaluate the existing landscape, townscape and visual resources within the TVIA study area. The desk study will involve a review of the relevant national and local landscape character assessments, analysis of relevant national and regional landscape policies and analysis of map data and other relevant guidance documents. Field surveys will be undertaken to confirm or define townscape/landscape character areas and confirm character boundaries and descriptions. A robust description of the baseline townscape character areas will be established, upon which an assessment of their sensitivity to accommodate change will be based.

6.7.16. Visual impacts will be assessed using Zone of Theoretical Visibility (ZTV) studies extending 5 km from the centre of the Project and a viewpoint analysis representing sensitive receptors within the study area at a range of distances and directions from the proposed development. Some viewpoints might be selected outside the study area where agreed with the local planning authorities.

6.7.17. The assessment will involve a desk study, field observations, the preparation of computer generated ZTVs and wire frames/photomontages for the viewpoint assessment, as well as analysis of this data.

6.7.18. The viewpoint assessment will consider the impacts of the different components of the proposed development. These include:

- primary fuel stores;
- boiler house;
- turbine hall;
- stack; and
- ancillary buildings.

6.7.19. A preliminary ZTV will be prepared for the proposed development. The ZTV will illustrate the potential maximum theoretical visibility of the proposed development over the 5 km study area based on an indicative maximum stack height and the height of the boiler house, the two tallest Project structures that would be built. It should be noted that the ZTV for the 5 km study area will be based on Land-Form Panorama DTM Ordnance Survey Data (1:50,000 scale), which does not take account of surface features or localised variations in landform; therefore it presents the maximum theoretical visibility. A more detailed ZTV will also be undertaken on a smaller area, using more detailed landform data which includes buildings and vegetation, to enable visibility from adjacent urban areas to be accurately evaluated.

6.7.20. The visibility of the proposed development including the different components, from identified receptors, will be described.

6.7.21. The impacts upon visual amenity from key settlements including Bootle, Crosby, Litherland, Liverpool, Walton and Wallasey will be assessed. There will be an assessment from transport corridors including the A5036, the Merseyrail Northern line, the Liverpool to Dublin and Isle of Man vehicle ferries and the Mersey passenger ferry. The long distance walks within the study area of the Sefton Coastal Path, the Wirral Coastal Way and the Trans Pennine Trail and National Cycle Routes 56 and 62 will also be assessed.

6.7.22. A viewpoint assessment will be carried out to determine the impact of the Project on specific receptors and viewpoints in the study area. Twelve potential viewpoints for inclusion in the assessment have been identified following an initial desk based assessment and analysis of Ordnance Survey maps, and following initial consultation with Sefton MBC, Liverpool CC and Wirral BC. Two viewpoints lie outside of the 5 km study area, and have been included following consultation with consultees (including Sefton MBC, Liverpool CC and Wirral BC). These viewpoints are listed in Table 16 and their locations shown in Figure 6.

6.7.23. The suggested viewpoints, which have been discussed with Sefton MBC, as well as Liverpool CC and Wirral BC, will be confirmed through field work as part of the baseline evaluation. In addition, it is anticipated that this viewpoint selection will be refined, based on any further comments received from consultees. Views from Public Rights of Way (PROW), recreational routes, settlements, tourist destinations, popular viewpoints and transport routes have been included in the viewpoint list.

6.7.24. The magnitude of the change to the existing conditions resulting from the Project on the landscape/townscape and visual amenity of the area will be predicted and the significance of these changes assessed.

Assessment Criteria

6.7.25. **Sensitivity** is assessed for both landscape receptors such as designated areas and landscape or townscape character areas, and for visual receptors (people) at viewpoints. It provides an indication of the likelihood of unacceptable effects on those receptors from a development of the type proposed. A description of how sensitivity is assessed for each receptor type is included below. It is rated on the following scale:

- High – material effects are likely to arise from a development of this nature.
- Medium – material effects may arise from a development of this nature.
- Low - material effects are unlikely to arise from a development of this nature.
- Negligible - material effects are very unlikely to arise from a development of this nature.

Table 17: Proposed Viewpoints

Proposed Viewpoints		Grid Reference	Direction / Distance from Site	Key Receptors
1.	Liverpool Irish Ferry Terminal, Gladstone Dock, Bootle	SJ 335 946	SW / 0.8 km	Port Workers, Ferry Passengers
2.	Car Park at Marine Lake, Crosby	SJ 316 977	NW / 2.5 km	Sefton Coastal Footpath Walkers, Recreational Boat Users
3.	Lifeguard Station and Slipway, Marine Promenade, New Brighton	SJ 312 941	W / 1.6 km	North Wirral Coastal Path Walkers, NCR56 Cyclists, Road Users, Local Residents
4.	Junction of Peel Road and Primrose Road	SJ 331 961	N / 0.7 km	Local Residents, Road Users
5.	Isle of Man Ferry	SJ 320 950	W / 0.7 km	Ferry Passengers
6.	Seacombe Ferry Terminal	SJ 325 908	S / 4.2 km	Ferry Passengers
7.	Woodside Ferry Terminal	SJ 329 892	S / 5.9 km	Ferry Passengers
8.	Everton Park Viewpoint	SJ 355 922	SE / 4.0 km	Local Residents, Park Users
9.	Vale Park Pedestrian Shelter, Wallasey	SJ 314 933	SW / 2.1 km	North Wirral Coastal Path Walkers, NCR56 Cyclists, Park Users
10.	Bidston Hill, Birkenhead	SJ 287 893	SW / 7.0 km	Walkers
11.	Marine Lake, New Brighton	SJ 306 943	SW / 2.1 km	North Wirral Coastal Path Walkers, NCR56 Cyclists, Road Users, Local Residents
12.	Wallasey Town Hall	SJ 321 915	SW / 3.7 km	North Wirral Coastal Path Walkers, NCR56 Cyclists, Road Users, Local Residents

6.7.26. Sensitivity of landscape / townscape character areas is influenced by their characteristics and is frequently considered within documented landscape character assessments and capacity studies. Sensitivity of visual receptors is primarily a function of the expectations and occupation or activity of the receptor and the importance of the view. Sensitivity of designated landscapes is influenced by their value as indicated by their designation.

6.7.27. **Magnitude** of effect is assessed for all receptors and identifies the degree of change. It is rated on the following scale:

- High – Total or major alteration to key elements, features or characteristics, such that post development the baseline situation will be fundamentally changed.
- Medium - Partial alteration to key elements, features or characteristics, such that post development the baseline situation will be noticeably changed.
- Low – Minor alteration to key elements, features or characteristics, such that post development the baseline situation will be largely unchanged despite discernible differences.
- Negligible – Very minor alteration to key elements, features or characteristics, such that post development the baseline situation will be fundamentally unchanged with barely perceptible differences.

6.7.28. **Significance** indicates the importance of the effect, taking into account the sensitivity of the receptor and the magnitude of the effect. It is rated on the following scale:

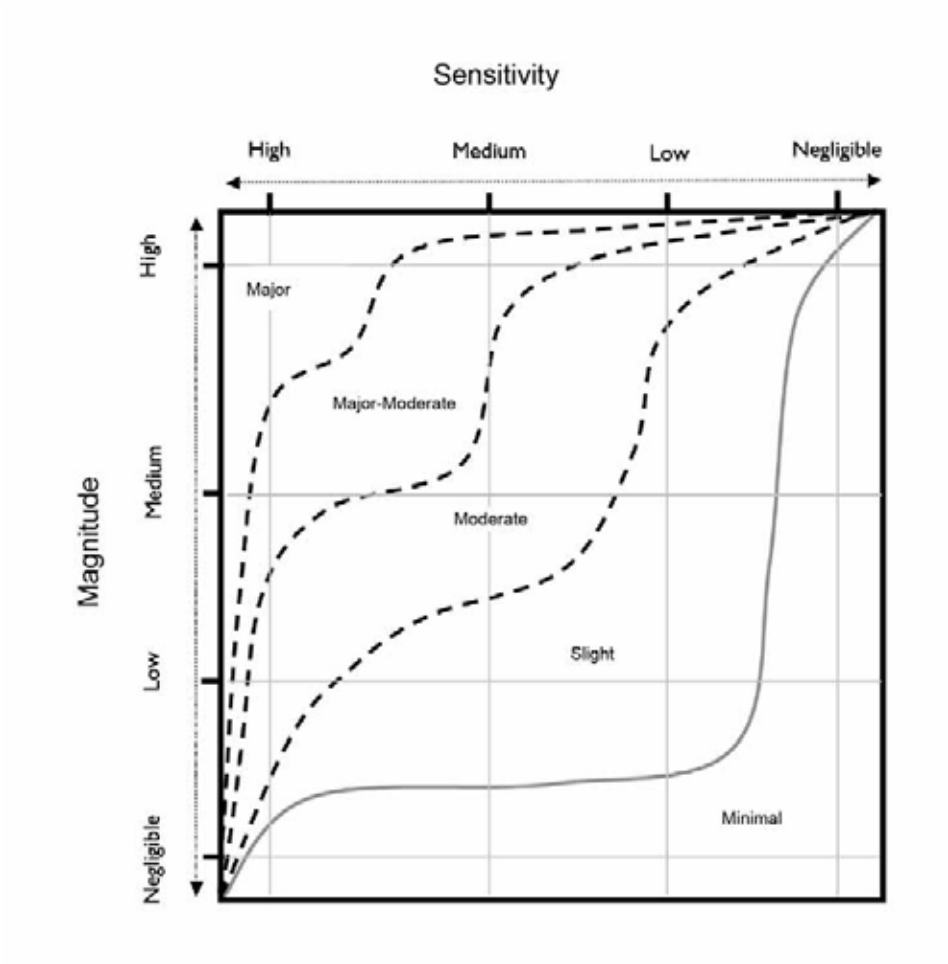
- Major (sometimes called Substantial) – indicates an effect that is very important in the planning decision making process.
- Major-Moderate - indicates an effect that is, in itself, material in the planning decision making process.
- Moderate – indicates a noticeable effect that is not, in itself, material in the planning decision making process.
- Slight (sometimes called Minor) - indicates an effect that is trivial in the planning decision making process.
- Minimal (sometimes called No Change) - indicates an effect that is akin to no change and is thus not relevant to the planning decision making process.

6.7.29. Effects that are Major-Moderate or Major are the most significant, in that they are, in themselves, material to the decision. Effects of Moderate significance or less are additional considerations. It should also be noted that whilst an effect may be significant, that does not necessarily mean that such an impact would be unacceptable.

6.7.30. Where intermediate ratings are given, e.g. “Moderate-Slight”, this indicates an effect that is both less than Moderate and more than Slight, rather than one which varies across the range. In such cases, the higher rating will always be given first; this does not mean that the impact is closer to that higher rating, but is done to facilitate the identification of the more significant effects within tables.

6.7.31. The process of forming a judgement of significance of effect is based upon the assessments of magnitude of effects and sensitivity of the receptor to come to a professional judgement of how important this effect is in terms of making a decision about whether planning permission should be granted. This judgement is illustrated by Diagram 3.

Diagram 3: Judgement of significance



Potential Mitigation Measures

6.7.32. Best guidance emphasises that the mitigation of significant effects should not be an afterthought to a Project, but rather should be an integral part of the design development exercise.

6.7.33. The mitigation proposals will be developed incorporating a number of environmental objectives to mitigate landscape/townscape and visual impacts. Impacts that cannot be best mitigated by "Avoidance" or "Reduction" by the adoption of alternative designs will be incorporated in the proposals. It follows, then, that mitigation will concentrate on the following categories:

- compensation: in which impacts that cannot be avoided are compensated by the rehabilitation of other parts of the landscape/townscape. Such measures may take time to reach maturity; and
- reduction: in which reduction of impact by site design, detailed design or screening proposals will be considered.

6.7.34. Mitigation considerations for this Project include the following:

- careful and considered site layout and plant design to improve visual acceptability where possible, in particular with regard to close range views from residential areas;
- careful site layout to locate entrances and areas of intrusive activity away from sensitive receptors;
- careful and considered façade treatments (colour and pattern), in particular with regard to large buildings and plant in close proximity to residential receptors, in order to improve visual acceptability;
- possible on-site screening, in terms of landform or vegetation, to mitigate/reduce the impact of local views; and

- consideration of the peripheral coastal location of the Site as a gateway to the Port of Liverpool as seen from the coast and the sea.

6.8. Transport, Traffic and Access

Overview

6.8.1. The traffic, transport and access assessment will address the potential impacts of the Project in terms of the associated road movements during demolition and construction, operation, and decommissioning phases.

6.8.2. A programme of demolition works will be required as part of the Site clearance works. Brief details of the demolition works, as they relate to the export of materials, are outlined below, where load equals HGV load:

- brick (crushed or loaded straight out) – 650 to 700 loads;
- timber (roofs) – 32 loads;
- general (from offices) – 2 to 3 loads;
- steel – 70 loads;
- slates – approximately 10 loads;
- asbestos – 1 load (based on available survey information); and
- Total of 816 HGV loads (worst case).

6.8.3. The demolition contract will comprise 13 weeks, although, the first week of the contract will comprise preparation. The material from the demolition works will therefore be exported off-site over a 12 week period. The demolition works is assumed to be undertaken over the period 0700 to 1800 hours, Monday to Saturday, i.e. over 12 hours per day, six days per week. This results in an average of 12 HGVs in / out per day, which is equivalent to an average of 1 HGV per hour in / out over the 12 hour working day.

6.8.4. The total workforce on-site throughout the demolition contract is expected to be 16 staff and these will arrive between the hours of 0600 to 0700 and depart between the hours 1800 to 1900. Assuming that no car sharing or use of public transport takes place, a maximum of 16 private vehicles will arrive at the Site in the morning and depart the Site in the evening.

6.8.5. The construction work will take approximately 36 months. It is expected that the construction workforce will peak at approximately 500 staff in months 20 - 26, with an average of 300 staff over the construction period. The assumed construction day shift will be 0700 to 1800 hours, Monday to Saturday (comprising a 10 hour shift plus a one hour break). For robustness, the assumption will be made that 80% of staff will travel to the Site by private car with an average occupancy of 2 staff per vehicle and 20% will travel to Site in mini-buses with an average occupancy of 7 staff per vehicle. This is to account for the fact that some of the general and specialist staff will work in gangs. The resulting construction staff traffic volumes are 215 arrivals during the period 0600 to 0700 hours and 215 departures during the period 1800 to 1900 hours.

6.8.6. The typical daily civil and mechanical works traffic (HGV and Light Goods Vehicle, LGV) during the construction period will comprise 43 HGVs and 23 LGVs, spread evenly over the daily shift period. This is equivalent to 6 vehicles per hour per direction for the shift period.

6.8.7. An operational workforce of around 45 is anticipated and this will be made up of 16 staff on permanent day work with the remaining 29 staff being shift based operational, maintenance and fuel staff split over a seven day shift pattern.

6.8.8. All of the imported biomass fuel and a proportion of that fuel sourced indigenously will arrive at the Port of Liverpool by ship and be transferred to the Fuel Reception and Storage Area via an enclosed belt conveyor system. The remainder of the indigenous fuel will be delivered to the Site via road. It is anticipated that up to 20% of the 1,200,000 tpa of fuel will arrive by road in 26.5 tonne loads, between 0700 and 2100 hour, seven days per week, namely 34 vehicles per day per direction. This equates to between 2 and 3 HGVs per hour per direction on the road network. If 100% of fuel were assumed to arrive by road, which is highly unlikely, this would equate to between 10 and 11 HGVs per hour per direction.

6.8.9. Ash export and reagent import will comprise 25,000tpa and will be transported by road in 20 tonne loads. Assuming a worst case whereby all ash is exported by road and that this export and reagent import takes place between Monday and Friday, this equates to 4 HGVs per day per direction arriving and departing the Site. Other deliveries will include 26 deliveries of fuel oil annually, which equates to 2 to 3 HGVs per month.

6.8.10. The decommissioning phase is expected to take around nine months. The decommissioning workforce is expected to peak at around 200 staff, although the average workforce will be around 100 staff and the typical daily volumes of civil and mechanical works traffic are expected to be much lower than during the demolition and construction phase.

6.8.11. Access to the demolition and construction site and ultimately the Site will be facilitated either via the Main Port Gate at Seaforth or the Strand Gate. Access via the Main Port Gate will be available 24 hours a day, seven days a week whereas access via the Strand Gate is limited to the period 0615 to 1915 hours, Monday to Friday.

6.8.12. Based on the above, it is anticipated that the most significant vehicle movements associated with the development will occur during the demolition and construction phase.

6.8.13. Associated with the construction of the Project will be the installation of an underground cable between the Site and Bootle Grid Substation. The route of the cable will comprise sections along Strand Road, Washington Parade, Marsh Lane and Hawthorne Road.

6.8.14. The application for the DCO is not seeking consent for the arrival, docking and unloading of biomass material by ship, as these are already consented activities for the Port of Liverpool i.e. the arrival and handling of port cargo. These activities will also be managed by the Port of Liverpool once operational. The EIA will therefore not consider the environmental impacts from shipping movements.

Baseline Description

6.8.15. Scoping discussions have been held with the Highways Development Control sections of Sefton MBC and Liverpool CC, the local highway authorities and the Highways Agency (the strategic highway authority), regarding the most appropriate vehicular routes to the demolition and construction site, the demolition works and the scope of the supporting Transport Assessment (TA). Separate discussions were also held with Sefton MBC regarding the installation of the underground cable given that the installation works would affect roads within its administrative area.

6.8.16. Given the respective locations of the two Port Gates that will provide access to the Site, four possible access routes have been identified for demolition and construction traffic. These are as follows:

- Route 1 - From the northwest via the A565 Crosby Road to the Seaforth Gate;
- Route 2 - From the north and east via the A59/M57/M58 Interchange (Switch Island) and the A5036(T) Dunnings Bridge Road to the Seaforth Gate;
- Routes 3 - From the east via the M62, A580(T), A5058 Queens Drive; Balliol Road, Millers Bridge and the A565 Derby Road, Primrose Road and the Strand Gate or alternatively continue on A565 corridor to the Seaforth Gate; and
- Route 4 - From the south and the Wirral via the A565 corridor to either the Strand Gate or the Seaforth Gate.

6.8.17. It should be noted that Routes 2 and 3 comprise the existing established routes for HGV traffic to the Port.

6.8.18. The four possible access routes identified above will also be examined for their suitability for fuel delivery.

Assessment Methodology

6.8.19. An assessment of the road traffic associated with the Project (during demolition and construction, and operation) will be carried out. The predicted volumes for each phase are outlined above. These flows will be compared against baseline levels in the vicinity of the Site.

6.8.20. The extent of delivery of fuel by road will be considered in terms of the impact of the development on the local and strategic highway network, during the operational phase.

6.8.21. The environmental impact of development generated traffic will be assessed with reference to the EIA Regulations and the 'Guidelines for the Environmental Assessment of Road Traffic'[69]. The scope of the assessment has been informed by the scoping discussions with the Highways Development Control sections of Sefton MBC and Liverpool CC and also the Highways Agency.

6.8.22. To inform the assessment of the environmental effects from traffic, a TA will be prepared separately (as a stand-alone supporting document to the DCO application and appended to the ES). The scope of the TA has been agreed with the local highway authorities and the Highways Agency.

6.8.23. A site visit will be undertaken to observe background transport conditions and identify access constraints and opportunities.

6.8.24. The potential impacts resulting from demolition and construction traffic and operational traffic likely to be generated by the Project will be considered.

6.8.25. Any existing traffic surveys and records of road personal injury accidents will be collected for the proposed access routes and an element of new traffic data collection is anticipated.

Assessment Criteria

6.8.26. The assessment will investigate issues including severance, driver delay, pedestrian amenity and delay, accidents and safety associated with the proposed development with reference to the above guidance.

6.8.27. For evaluation purposes, the scale of the environmental impacts associated with the demolition and construction traffic and operational traffic have been categorised as outlined within Table 20. Only those impacts with a rating of either High or Medium are significant effects as they will dictate the need for either permanent or temporary mitigation measures.

Table 18: Traffic Assessment Significance Criteria

Significance Rating	Description of Significance
High	Where the impact leads to serious and lasting disruption (e.g. a 90% increase in baseline traffic) and permanent mitigation measures are required.
Medium	Where the impact is of a temporary nature, leading to disruption (e.g. a 60% increase in baseline traffic) and short term mitigation measures are required.
Low	Where the impact exceeds industry standard design thresholds, or the traffic increase is above 30%, but does not lead to disruption. No mitigation measures are required.
Negligible	No perceivable impact. No mitigation measures are required.
Positive	Where the proposals result in an improvement to current conditions.

[69] Guidelines for the Environmental Assessment of Road Traffic, Institute of Environmental Assessment.

Potential Mitigation Measures

6.8.28. Impacts relating to demolition and construction traffic are temporary in nature, although they can still have an impact during the respective periods. The likely increases in traffic flows on the immediate highway network as a result of the various activities are not predicted to be significant. However, the types of vehicles, their routing to and from the Site and the hours of operation will be sensitive and will need to be agreed with the local and strategic highway authorities. A Construction Transport Management Plan (CTMP) will be agreed with the various highway authorities to minimise these impacts and this will also cover construction works associated with the installation of the underground cable.

6.8.29. It is anticipated that the majority of abnormal loads will be delivered to the Port by ship and transferred to the Site either directly at the Site or via the Port's internal road network. Some abnormal loads may, however, arrive by road. The timings of road borne abnormal loads will be looked at carefully to see when these would result in the least impacts on other road users and details would be included in the CTMP.

6.8.30. Scoping discussions with the local highway authorities have confirmed that there is no requirement for a Travel Plan due to the small numbers of operational staff.

6.9. Cultural Heritage and Archaeology

Overview

6.9.1. An initial assessment has been undertaken to establish the presence of archaeological and cultural heritage features of international (e.g. WHS), national (e.g. Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens, and Registered Battlefields) and local importance (e.g. local sites and features). A 2 km buffer from the Site and Grid Connection Route was considered for this initial assessment (see Figure 7).

6.9.2. Only web sources were consulted at this early stage in the process. These websites included MAGIC, Images of England and the Archaeology Data Service (ADS) and were searched in February 2011. Further information on the recorded archaeology and cultural heritage resources and investigations identified from this study are provided in Appendix E.

6.9.3. During the production of this study, initial consultation was carried out with the Merseyside Archaeological Officer (Merseyside Archaeological Service), the Planning & Economic Regeneration Department (Sefton MBC) and the Inspector for Ancient Monuments for the North West Region (English Heritage).

6.9.4. Requests and recommendations received by consultees have been taken on board and will be implemented during the next stage of assessment (within the desk-based assessment and full impact assessment). It is proposed that these consultees will also be contacted during the next stage of the process.

Baseline Description

6.9.5. There are no WHS, Scheduled Monuments or Registered Battlefields located within the 2km study area. There is one WHS located just over 2 km south of the Site, the Liverpool Maritime Mercantile City (Ref. WHS1). The United Nations, Educational, Scientific and Cultural Organisation (UNESCO) website provides information on this WHS, stating that:

6.9.6. "The city and port of Liverpool are exceptional testimony to the development of maritime mercantile culture in the 18th and 19th centuries, and played an important role in the growth of the British Empire. Liverpool is an outstanding example of a world mercantile port city, which represents the early development of global trading and cultural connections throughout the British Empire. The city was also a major centre generating innovative technologies and methods in dock construction and port management in the 18th and 19th centuries. Liverpool was a pioneer in the development of modern dock technology, transport systems and port management. The listed sites feature a great number of significant commercial, civic and public buildings, including St George's Plateau."

6.9.7. The World Heritage Site relates to six areas of the historic centre and the docklands of Liverpool covering a buffer zone of 751 ha.

6.9.8. The nearest Scheduled Monument relates to the medieval Sefton Old Hall moated site and fishponds at Sefton just over 6 km to the north-west (NGR SD 356 011 (335667, 401120).

6.9.9. There is one Registered Park and Garden located approximately 1.7 km to the east of the Site. This is Derby Park (Ref. RPG1) which is a Registered Grade II Public Park covering an area of 9 ha that was opened in 1895 (see Figure 7).

6.9.10. With regards to Listed Buildings, the search identified fifty-one, within the 2 km study area. These included two Grade II* buildings, one comprises a 19th Century fort (LB1) known as Fort Perch Rock, which was built to defend the approach to Liverpool and is now a museum. The other building is a row of 6 terrace houses (LB2) referred to as Nos. 8-18 Percy Street, which date to the 1830s. The other twenty-seven Buildings are Registered Grade II and include churches/chapels, shelters, former school buildings, a gate house, gates and gate piers, a sundial, residential properties, a villa, public houses, memorial structures/statues, a cinema, a town hall, a pump house, a fire station, a library, public baths, warehouses, a Methodist Sunday School, a former Post Office, Police Judicial Courts and offices. The location of these Listed Buildings is shown on Figure 8 and further information is provided in Appendix E.

6.9.11. There is one recorded archaeological feature on the Site concerning its former use, as it once formed part of Hornby Dock (Ref. 1) which, according to archaeological web databases, was constructed between 1880-83 and was mainly used to facilitate transport of timber (see Figure 7). The same sources also indicates that the lock entrance was bombed during the Second World War, and the dock was later infilled to provide land to store coal (referred to as Powergen coal terminal[70]). The Desk Study indicates that the northern part of the Site was infilled between 1992 and 1994. It is understood the former dock was infilled using inert construction and excavation waste. The Site is now regarded as brownfield land.

6.9.12. The Desk Study of the Site provided information on the buildings present. In response to a request made by Sefton MBC during preliminary consultation, 'Appendix B Site Photographs' from the Desk Study are presented as Appendix F to the ESR. Figure 8 presents the Site as being split into eleven areas, which has been informed by the Desk Study. It is proposed that the full Desk Study is presented as an appendix to the ES.

6.9.13. With obvious ground disturbance taking place in these areas, any archaeological remains, if present, would have been removed near surface. The extent of the disturbance is not currently known at this stage. It is also understood that the northern part of the Site has been formed by infilling with excavation material. Thus, this infilled material will not contain any archaeological remains.

6.9.14. There are, however, features on the Site which may be of historical or archaeological interest (see Figure 8). Due to the physical appearance of the East Hornby Shed (Area 1, Figure 8) and parts of the Henry Bath Metals Shed (Area 7, Figure 8), the Desk Study suggests that these may be the original brick buildings with arched openings, which were constructed between the 1890s and early 1900s. Furthermore, part of the ground surface within and immediately outside the Henry Bath Metals Shed (Area 7, Figure 8) is cobbled, suggesting this is the original surface which was laid when the building was constructed. Cobbled surfaces are also noted between the two rows of sheds (between Areas 6 (Cargill Grain Shed) and 10 (Alexandra Quay East Shed) and between Areas 7 (Henry Bath Metals Shed), 8 and 9 (Alexandra Quay West and Central Sheds respectively, Figure 8)). Furthermore, rail sidings are noted around the warehouse buildings in Areas 8 to 10 and these are believed to relate to the operation of a travelling crane which is portrayed on the 1:10,000 Ordnance Survey Maps 1965-1967, 1984-1989, 1999, 2006 and 2010.

6.9.15. Other features of possible historical interest include the former quay wall and associated mooring bollards, which are visible along the northern side of the warehouses (within Areas 2 and 3, Figure 8). Although it is noted that the wall does not continue into Area 4 (JMD Haulage Contractor's Site), only disused mooring bollards were noted within this area (see Figure 8). A weighbridge facility is also noted outside the Cargill Grain Shed (Area 6, Figure 8).

[70] According to Eon-UK website "Hornby Dock is a coal-washing facility adjacent to Liverpool Bulk Terminal. {…} The Hornby site is operated and maintained on Powergen's behalf by Optimum Fuels Ltd, who employs thirty contractors on the site" (www.eon-uk.com/about/992.aspx). The Liverpool Bulk Terminal is situated at Gladstone Dock which is to the north of the Alexandra Dock site, and there is a conveyor between the Hornby site and the Liverpool Bulk Terminal which enables transportation of coal between the two sites (www.eon-uk.com/about/crarchive/1577/aspx).

6.9.16. In relation to local archaeological features, it is noted that a considerable number of features are recorded within the 2 km study area around the Site boundary (see Figure 7). The two earliest finds relate to a grooved stone axe of North American origin which is believed to have come from ballast discharged from ships (Ref. 31, Figure 7) (a specific date for this find is not provided) and a Late Bronze Age flint arrowhead (Ref. 109). There are two medieval features recorded within the 2 km study these concern a Bronze bottle dating to the 15th or 16th century and a late Saxon cross base which is situated on the south side of St Mary's Church. The majority of the resources date to the post-medieval and modern periods. These include a considerable number of ship wrecks (Refs. 2-30 and 63), churches (Refs. 34-37) and associated crosses (Ref. 105), prisons (Refs. 115 and 119), a workhouse (Ref. 122), a cinema (Ref. 54), a cricket ground (Ref. 55), a sports ground (Ref. 128) swimming pools/baths (Refs. 57-58 and 123-124), a bowling club (Ref. 127), a hospital (Ref. 59) and various industrial buildings such as warehouses (Refs. 38-44 and 51), a school (Ref. 125), offices (Ref. 48), engineering works (Ref. 46), gasholder works (Ref. 49) and a tar distillers (Ref. 47). Parts and features of the docks and associated railways/railway branches around the Site are also recorded in the archaeological databases such as those relating to Alexandra Dock (Refs. 60, 72 and 81), Canada Dock (Refs. 66 and 69), Gladstone Dock (Refs. 62 and 71) and Langton Dock (Refs. 64, 78 and 83) to name a few. A number of Second World War features and sites are also recorded within the 2 km study area, these include air raid shelters (Refs. 84, 85 and 99), batteries (Refs. 86, 96 and 97), barrage balloon sites (Refs. 88, 94-95 and 98), a tank trap (Ref. 92), pillboxes (Refs. 87, 90-91 and 93), a Rocket Projector Battery (Ref. 126) and a munitions production factory which is destroyed (Ref. 50). There are also unidentified features recorded within the surrounding area, although no other information is provided on these features (Refs. 31 and 33). Further information on these archaeological sites and features is provided in Appendix E.

6.9.17. Initial investigations have revealed features on the Site which may be of historical or archaeological interest. The Project includes the demolition of all the buildings currently present on the Site. Thus the demolition and construction phase of the development will have a direct impact on these structures. Furthermore, it cannot be confirmed, at this stage, that there is no potential for archaeological remains to be present where limited or no disturbance has taken place. Thus any ground excavation works undertaken during the demolition and construction phase, will have a direct impact on any resources if present. It should also be noted that there is the potential that the demolition and construction phase and operational phase of the development may have an impact on the setting of buildings of cultural heritage importance within the surrounding area, however, at this stage it is believed this impact will be limited given the surrounding area is heavily built up.

6.9.18. There is also the potential for archaeological deposits to be present within the banks and river bed of the Mersey Estuary. As waterlogged areas such as rivers and streams provide ideal conditions for the preservation of organic remains, as it prevents oxidisation. In addition, such waterlogged areas were used in the Bronze Age and Iron Age as sacrificial sites. Therefore, depending on the development proposals relating to the cooling water infrastructure, this will have a direct impact on any remains if present.

Assessment Methodology

6.9.19. As the level and extent of potential disturbance across the Site is unknown at this stage and, given that the Site has the potential to contain archaeological remains and features of historical interest, an archaeological desk-based assessment (DBA) will be produced. This assessment would confirm initial findings, establish the extent of disturbance across the Site and the potential for unidentified remains on the Site and within the Mersey Estuary, if present, and whether those features on Site are of historical or archaeological interest.

6.9.20. The archaeological DBA would provide a catalogue of the known archaeological sites/features (international, national and local) within a 100 m radius of the Indicative Red Line Boundary. Further consideration will also be given to the potential presence of unknown/unidentified archaeological remains on the Site and the Mersey Estuary and identify where such features may be located. An assessment of the features on the Site identified in this study would be carried out to establish whether they are of archaeological or historical importance.

6.9.21. During the production of the desk study, various consultees will be contacted. These would include: the Planning and Economic Regeneration Department at Sefton MBC, the Local Inspector of Ancient Monuments at English Heritage and Liverpool Museum (the archaeological advisor to Liverpool CC).

6.9.22. Relevant archaeological data would be purchased from the Historic Environment Record (HER) held by the Merseyside Archaeological Service and the National Monuments Record (NMR) held by English Heritage.

6.9.23. A systematic search would be undertaken of all readily available and relevant documentary records, such as cartographic sources, aerial photographs, any archaeological reports and records, together with geological/ soil surveys and engineering data.

6.9.24. The Site and Grid Connection Route would also be walked to gain an appreciation of the landscape and the location in terms of its archaeological context.

6.9.25. Consultation would also be undertaken with Liverpool Museum and Liverpool CC regarding the potential for any impacts on the WHS located to the south of the Site (as requested by the Inspector for Ancient Monuments at English Heritage).

6.9.26. The assessment will be carried out in agreement with Sefton MBC and in accordance with PPS5 Planning for the Historic Environment, the Historic Environment Planning Practice Guide which accompanies PPS5, Historic Environment Local Management (HELM) guidance on Renewable Energy and relevant guidance from the Institute for Archaeologists (IfA).

6.9.27. It is possible that further archaeological survey may be required following the completion of the archaeological DBA depending on the sensitivity of the Site and likely features of importance found. This will be discussed and agreed with consultees as appropriate.

6.9.28. Following the completion of the DBA an ES chapter would be produced using the findings of the desk study. The ES chapter would assess the likely direct and indirect impacts associated with the development on each of the archaeological features and monuments identified in the DBA. The DBA report would be appended to the ES Chapter.

Assessment Criteria

6.9.29. There is no national standard guidance for the determination of a direct impact on archaeological or cultural heritage resources in relation to all types of development sites. There are however, guidance documents which assist in assessing the impacts on cultural heritage assets. These documents are listed below:

- The Design Manual for Roads and Bridges (DMRB) (Part 2 HA208/07 Cultural Heritage): provides guidance on the assessment of impacts on cultural heritage resources, but this is limited to road Projects only;
- The Department for Transport Analysis Guidance (TAG) on The Heritage of Historic Resources Sub-Objective (TAG Unit 3.3.9) produced in 2003: provides guidance on appraising impacts in relation to planning objectives (National, Regional and Local) and evaluating the impact of the transport proposals (for road Projects) and the overall assessment score for the proposals; and
- English Heritage guidance document, the 'Setting of Heritage Assets' in 2011: provides guidance on how to assess impacts on the setting of cultural heritage assets.

6.9.30. Therefore the above documents have been used subjectively together with professional judgment when determining the magnitude and significance of impacts on the features and designations, identified in the study area.

6.9.31. Tables 19 to 23 show how the importance and sensitivity of a cultural heritage asset, and the importance and sensitivity of the setting of an asset together with the magnitude of change will be established.

Table 19: Determining the Importance of an Asset

Level of Importance	Description
Very High	Monuments and buildings which are of international importance (e.g. World Heritage Sites)
High	Monuments which are scheduled (Scheduled Monuments) and those monuments of schedulable quality Listed Buildings (Grade I and II*) Undesignated archaeological sites of outstanding interest (national importance)
Medium	Archaeological features and sites which are of regional important Undesignated archaeological sites which are of regional importance Listed Buildings (Grade II) Conservation Areas, Registered Parks and Gardens and Registered Battlefields
Low	Archaeological features and sites which are locally important Undesignated archaeological sites which are of local importance
Negligible	Archaeological remains which are in poor condition or are found out of context Undesignated sites and historic landscapes whose importance is limited by poor preservation/survival
Unknown	Where the importance of an archaeological site/feature has not been established

Source: Based on Tables 5.1 and 6.1 of Annex 5 (Volume 11 Section 3 Part 2 Cultural Heritage) of the Design Manual for Roads and Bridges (DMRB) (HA208/07)

Table 20: Determining the Sensitivity of an Asset (in relation to direct impacts)

Level of Sensitivity	Description
Very High	Monuments and buildings which are of international importance (e.g. World Heritage Sites)
High	Scheduled Monuments and monuments of schedulable quality Listed Buildings (Grade I and II*) Undesignated archaeological sites of national importance
Medium	Regionally important archaeological features and sites Undesignated archaeological sites of regional importance Listed Buildings (Grade II) Conservation Areas, Registered Parks and Gardens and Registered Battlefields
Low	Locally important archaeological features and sites Undesignated archaeological sites of local importance
Negligible	Archaeological remains which are in poor condition or are found out of context Undesignated sites and historic landscapes whose importance is limited by poor preservation/survival

Source: Based on Tables 5.1 and 6.1 of Annex 5 (Volume 11 Section 3 Part 2 Cultural Heritage) of the Design Manual for Roads and Bridges (DMRB) (HA208/07)

Table 21: Determining the Importance of the Setting of an Asset

Importance of the Setting	Description
High	The setting of the asset is intrinsic to the survival, function and appreciation of the asset with strong visual links with other features within the surroundings
Medium	The setting of the asset is important to the survival, function and appreciation of the asset with some visual links with other features within the surroundings
Low	The setting of the asset makes a limited contribution to the survival, function and appreciation of the asset and the visual links with other features within the surroundings are very limited
Negligible	The setting of the feature is not important in the survival, function and appreciation of the asset

Source: SKM Enviros

Table 22: Determining the Sensitivity of the Setting of an Asset

Importance of the Setting	Level of Importance				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Very High	High	Medium	Medium	Low
Medium	High	Medium	Medium	Low	Low
Low	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low

Source: Based on Tables 5.4, 6.4 and 7.4 Annex 5 (Volume 11 Section 3 Part 2 Cultural Heritage) of DMRB (HA208/07)

Table 23: Determining the Magnitude of Change to the Asset

Magnitude of Change	Description
High	Complete destruction of the asset (direct impact) Comprehensive changes to the setting of the entire asset (the whole of the development is visible)
Medium	Considerable damage to the asset (direct impact) Considerable change in the setting of part of the asset (indirect impact) (majority of the development is visible)
Low	Partial or slight damage to the asset (direct impact) Slight change to the setting of part of the asset (indirect impact) (parts of the development are visible)
Negligible	Very minor damage to the asset Very minor change to the setting of a small part of the asset (indirect impact) (majority of the development is screened by existing or natural barriers (wooded areas, tree belts, hedges or other developments)
No Change	No damage (direct impact) No change to the setting of the asset (indirect impact) (the development is not visible at all)

Source: SKM Enviros but partly based on Tables 5.3, 6.3 and 7.3 of Annex 5 (Volume 11 Section 3 Part 2 Cultural Heritage) of DMRB (HA208/07). Please note that the terminology used to define the 'Magnitude of Change' has been changed to ensure consistency with other assessments within this ESR. E.g. 'High' = 'Major', 'Medium' = 'Moderate' and 'Low' = 'Minor'.

6.9.32. By combining the 'importance' and 'sensitivity' (of the asset or the asset's setting) with the 'magnitude of change', one can establish the 'significance of impact' associated with the proposals. The levels of 'significance of impact' are shown in Table 24. The nature of the impact can also be considered in terms of whether it is positive or negative as presented in Tables 25 and 26.

Table 24: Archaeological Assessment Impact Matrix

Magnitude of Change	Sensitivity (of the asset or its setting)				
	Very High	High	Medium	Low	None
High	Very High Significance	Very High/High Significance	High/Medium Significance	Medium/Low Significance	Low Significance
Medium	Very High/High Significance	High/Medium Significance	Medium Significance	Low Significance	Neutral Significance
Low	High/Medium Significance	Medium Significance	Medium/Low Significance	Low/Neutral Significance	Neutral Significance
Negligible	Low Significance	Low Significance	Low/Neutral Significance	Neutral Significance	Neutral Significance
No Change	Neutral Significance	Neutral Significance	Neutral Significance	Neutral Significance	Neutral Significance

Source: Based on Tables 5.4, 6.4 and 7.4 Annex 5 (Volume 11 Section 3 Part 2 Cultural Heritage) of DMRB (HA208/07). Please note that the terminology used to define the 'Magnitude of Change' and 'Significance of Impact' has been changed to ensure consistency with other assessments within this ESR. E.g. 'High' = 'Major', 'Medium' = 'Moderate' and 'Low' = 'Minor/Slight'.

Table 25: Determining the Significance of Impact (beneficial)

Impact Significance	Description
High	• Provide potential, through removal, relocation or substantial mitigation of very damaging or discordant existing impacts (direct or indirect) on the heritage, for very significant or extensive restoration or enhancement of characteristic features or their setting • Make a high contribution to government policies for the protection or enhancement of the heritage • Remove or successfully mitigate existing visual intrusion, such that the integrity, understanding and sense of place of a highly valued area, a group of sites or features of national or regional significance is re-established
Medium	• Provide potential, through removal, relocation or mitigation of damaging or discordant existing impacts on the heritage, for significant restoration of characteristic features or their setting • Contribute to regional or local policies for the protection or enhancement of the heritage • Enhance existing historic landscape/townscape character through beneficial landscaping/mitigation and good design
Low	• The proposals which are not in conflict with national, regional or local policies for the protection of the heritage • Restore or enhance the form, scale, pattern, or sense of place of the heritage resource through good design and mitigation • Remove or mitigate visual intrusion (or other indirect impacts) into the context of locally or regionally significant heritage features, such that appreciation and understanding of them is improved
Neutral	• The proposals which are not in conflict with, and do not contribute to policies for the protection or enhancement of the heritage • Maintain existing historic character in a landscape/townscape • Have no appreciable impact, either positive or negative, on any known or potential heritage assets • Are a combination of slight positive and negative impacts, on locally significant aspects of the heritage • Do not result in severance or loss of integrity, context or understanding within a historic landscape
None	• There are no impacts predicted upon the cultural heritage

Source: Based on Table 1 Heritage of Historic Resources – Definitions of Overall Assessment Scores from TAG Unit 3.3.9 within the Department for Transport's Transport Analysis Guidance: The Heritage of Historic Resources, Sub-Objective (2003). Please note that the terminology used to define the 'Significance of Impact' has been changed to ensure consistency with other assessments within this ESR. E.g. 'High' = 'Major', 'Medium' = 'Moderate' and 'Low' = 'Minor'.

Table 26: Determining the Significance of Impact (Adverse)

Impact Significance	Description
High	• Have a major direct impact on nationally significant heritage assets such that they are lost or their integrity is severely damaged • Have a moderate direct impact on or compromise the wider setting of multiple nationally or regionally significant heritage assets, such that the cumulative impact would seriously compromise the integrity of a related group or historic landscape/townscape • Have a major direct impact on regional heritage assets, such that their integrity is lost and no adequate mitigation can be specified • Would be highly intrusive and seriously damage the setting of the heritage resource, such that its context is seriously compromised and can no longer be appreciated or understood • Be in serious conflict with government policy for the protection of the heritage, as set out in PPG15 and PPG16[71] • Be strongly at variance with the form, scale and pattern of a historic landscape/townscape
Medium	• Proposals which are out of scale with, or at odds with the scale, pattern or form of the heritage resource • Are intrusive in the setting (context), and adversely affect the appreciation and understanding of the characteristic heritage resource • Are in conflict with local or regional policies for the protection of the heritage. • Are damaging to nationally significant heritage assets, resulting in the loss of features such that their integrity is substantially compromised, but adequate mitigation has been specified • Have a high adverse direct impact on important or moderately important heritage, resulting in loss of such that their integrity is substantially compromised, but adequate mitigation can be specified
Low	• Proposals which are in conflict with local policies for the protection of the local character of the heritage • Have a detrimental impact on the context of regionally or locally significant assets, such that their integrity is compromised and appreciation and understanding of them is diminished • Damage locally significant heritage features for which adequate mitigation can be specified • Do not fit well with the form, scale, pattern and character of a historic landscape/townscape/area
Neutral	• Proposals which are not in conflict with, and do not contribute to policies for the protection or enhancement of the heritage • Maintain existing historic character in a landscape/townscape • Have no appreciable impact, either positive or negative, on any known or potential heritage assets • Area a combination of slight positive and negative impacts, on locally significant aspects of the heritage • Do not result in severance or loss of integrity, context or understanding within a historic landscape
None	• There are no impacts predicted upon the cultural heritage

Source: Based on Table 1 Heritage of Historic Resources – Definitions of Overall Assessment Scores from TAG Unit 3.3.9 within the Department for Transport's Transport Analysis Guidance: The Heritage of Historic Resources, Sub-Objective (2003) . Please note that the terminology used to define the 'Significance of Impact' has been changed to ensure consistency with other assessments within this ESR. E.g. 'High' = 'Major', 'Medium' = 'Moderate' and 'Low' = 'Minor'.

[71] PPG15 and PPG16 have now been replaced by the National Planning Policy Framework (March 2012). However, they are stipulated in the guidance document used and therefore reference is retained in relation to these documents.

Potential Mitigation Measures

6.9.33. Potential mitigation measures at this stage are not known, but some form of archaeological survey may be required to record features found on-site. The type of survey requirements will be determined once the sensitivity and importance of likely features present are known and following consultation.

6.10. Socio - Economics

Overview

6.10.1. The ES will include consideration of the socio-economic impacts associated with the demolition and construction, operational and decommissioning phases of the Project. The physical scope covers a review of the prevailing social and economic conditions present within the vicinity of the proposed development and its context within Merseyside.

6.10.2. A study area of 3km has been agreed with Sefton MBC in preliminary consultation, however, it is proposed that the study area will extend to 5 km from the Indicative Red Line Boundary (this will incorporate consultation zones A and B as presented in the SoCC and will include Bootle in its entirety as well as the wider area of Crosby and Litherland to the north, Sandhill, Walton and Everton in Liverpool and New Brighton and Liscard within Wirral BC). As the 5 km study area extends into adjacent local authority administrative areas to Sefton MBC, namely Liverpool CC and Wirral BC, we therefore will seek their input in terms of the baseline environment and scope of the assessment. We would also welcome comment on the study area as part of scoping.

6.10.3. The prevailing social and economic conditions present within the Linacre and Derby wards (in which the Indicative Red Line Boundary area is situated), Sefton MBC and the wider Merseyside area (including Liverpool CC and Wirral BC administrative areas), and its context within the North West of England will be reviewed.

6.10.4. The assessment will involve:

- description of the socio-economic baseline through the use of demographic information;
- overview of consultation activities associated with the Project to inform the assessment of the public's attitude and key issues raised with regard to the Project;
- potential impact on surrounding community resources (for example, impact on recreational areas and Public Rights of Way (PROW));
- potential impacts on population and employment levels during demolition and construction, operation and decommissioning of the Project; this will incorporate consideration of the relative timing of these phases; and,
- likely public perception effects (including health and safety considerations) relating to a development of this nature.

6.10.5. In addition, comments regarding the requirement for an outline Health Impact Assessment (HIA) are sought through this ESR and through consultation with Prescribed Consultees. It is proposed that this assessment will draw together likely effects on health together from a number of other studies in the EIA, such as noise, traffic, and air quality. As discussed in Section 6.2, the air quality assessment will also provide an outline assessment of health impacts, if required.

Baseline Description

6.10.6. An initial assessment of the socio-economic baseline for the wards within which the Indicative Red Line Boundary area is situated has been undertaken, which will be presented in further detail in the ES. The most up to date data published and available will be used. A summary is included in the following paragraphs.

Population Dynamics

6.10.7. According to the Office of National Statistics (ONS), the estimated resident population in Sefton in 2010 was 272,900. This is a 3.7% decrease from the population level of 2001 (Census 2001). The population of Linacre and Derby wards measured as part of Census 2001 were 13,200 and 12,256 respectively. As the overall population within Sefton authority has decreased between 2001 and 2010, it is expected that the populations within Linacre and Derby wards are likely to have decreased at a similar rate.

6.10.8. Beyond Primrose Road / Derby Road there are residential properties. The closest residences are located approximately 400 m to the north east of the Site at the corner of Ronan Close backing on to Primrose Road.

General Health

6.10.9. The average healthy life expectancy[72] of the population within the Linacre and Derby wards in 2003 was 55.5 years for males and 62.7 years for females, and 62.2 years for males and 65.1 years for females respectively. These figures are lower than the average for Sefton, at 66.9 years and 70.7 years for males and females respectively, and lower than the national average for England which is 69.0 years and 72.3 years for males and females respectively.

Economic Activity

6.10.10. The percentage of the population in the Linacre and Derby wards who were economically active[73] at the time of the Census 2001[74] was 50.9% and 59.3% respectively, compared to 62.1% average in Sefton and 66.9% average in England. Since 2001, the level of unemployment across the UK has increased as a result of the recession.

6.10.11. The percentage of the population who claim Job Seekers Allowance (JSA) has been used here as a guide with regard to the estimate of the current level of unemployment in the study area. According to ONS, 12.6% of the working age population aged 16 to 74 years in Linacre ward claimed JSA in December 2011. In Derby ward, 9.0% of the working age population claimed JSA. This is compared to a 5.1% average across Sefton, and a 3.9% average for Great Britain. According to ONS, since 2007, these figures have increased from 8.1% in the Linacre ward and 4.9% in the Derby ward, and 2.9% on average in Sefton.

Education

6.10.12. According to Census 2001, in the Linacre ward the percentage of the total population with no qualifications or level unknown was 52.9%, and the proportion of the population with higher level qualifications[75] was 7.0%. In Derby ward, the comparative figures were 47.2% and 8.4% respectively. These statistics are significantly different from the average across Sefton, with 38.0% having no qualifications or level unknown, and 16.7% having higher level qualifications, and similarly for the average across Great Britain, with 35.8% and 20.4% respectively.

[72] Healthy life expectancy is the expected number of years of life in good or fairly good health. The statistic is captured by the Office for National Statistics, Experimental Statistics.

[73] Economically active relates to people who were working in the week before the Census and described as economically active. In addition, the category includes people who were not working but were looking for work and were available to start work within 2 weeks. Full-time students who are economically active are included.

[74] This is the latest available data obtained for this statistic. It is accepted that a Census was undertaken in 2011, but this data is not yet published and therefore not available for use.

[75] The term 'higher level qualifications' refers to qualifications of levels 4 and above (i.e. first degree, higher degrees, NVQ levels 4 and 5, HND, HNC and certain professional qualifications).

Deprivation

6.10.13. According to the 2010 Indices of Multiple Deprivation (IMD2010)[76], Sefton has an average rank of 114th in the most deprived administrative areas out of 326 districts (1st being the most deprived and 326th being the least). This has improved slightly from the Indices of Multiple Deprivation 2007 (IMD2007). The increase in JSA claimants in the area and the associated increase in unemployment levels are the key characteristics that contribute to the deprivation level within the authority's area.

Recreation

6.10.14. There are a number of recreational areas near to the Site. Each of these sites are accessible to the public and feature one or more of a range of public amenities such as children's play facilities, picnic areas, viewpoints, and wildlife walks. Those recreational areas that have been identified in proximity to the Site to date include:

- North Park, which is 1.7 km north east of the Site;
- Rimrose Valley Country Park, which is 1.7 km north of the Site;
- Derby Park, which is 1.9 km east of the Site;
- Crosby Coastal Park, which is 2.3 km north west of the Site; and
- Stanley Park, which is 2.9 km south east of the Site.

6.10.15. The final list of recreational sites to be included in the socio-economic assessment will be determined through continued consultation with Sefton MBC, Wirral BC and Liverpool CC and other relevant consultees. Comment on the preceding list would be welcomed during scoping consultation.

6.10.16. Public Rights of Way (PROW) that are located within 3 km of the study area, and any that are considered to be impacted due to visual impacts outside of the 3 km area, will be considered as part of the socio-economic assessment. Input from consultees with regard to PROW that need to be considered is welcomed.

6.10.17. In addition, any potential impacts on flight paths and zones linked to John Lennon Airport will be considered.

Assessment Methodology

6.10.18. There is currently no established EIA methodology for the assessment of socio-economic impacts. To assess the socio-economic impacts, two sources of guidance will be used. Firstly, the "Guidelines and Principles for Social Impact Assessment" (May 1994)[77]. In addition, guidance contained within 'Social Impacts and Wellbeing: multi-criteria analysis techniques for integrating nonmonetary evidence in valuation and appraisal', written by the Social Impacts Taskforce and published by Defra in December 2011 will be used.

6.10.19. The assessment will address the potential direct, indirect and wider socio-economic impacts resulting from the Project during demolition and construction, operation and decommissioning. The impacts considered in the assessment will include:

- population characteristics (population dynamics and stakeholder mapping);
- community and institutional structures (employment, training, skills and qualifications, economic investment, business development and equal opportunities);
- individual and family changes (perceptions of risk, health and safety, attitudes towards the Project and concerns about social well-being); and
- community resources (security, access to local amenities and recreation).

6.10.20. The economic assessment will be based on the following methodology:

[76] The English Indices of Deprivation 2010, Communities and Local Government. Published 24th March 2011. Available at: http://www.communities.gov.uk/publications/corporate/statistics/indices2010.

[77] These are US-based guidelines. It is the only guidance published that covers the assessment of social impacts in the context of an EIA.

- estimates of employment levels for the demolition and construction phase and operational phase to be provided by the Project;
- an estimate of spending generated by employees (based on research by YouGov from 2005)[78];
- indirect employment levels to be calculated by applying a local level multiplier[79]; and
- using accepted good practice in terms of converting temporary employment into full-time equivalents (FTEs)[80] [to equate demolition and construction activity associated with the Project to permanent full-time jobs].

6.10.21. In addition, guidance from "The Green Book: Appraisal and Evaluation in Central Government" HM Treasury (2003) will be used to inform the economic appraisal.

6.10.22. In addition, reference will be made to other chapters that cover socio-economic related issues (e.g. air, noise, traffic and landscape). The methodology will include collection of a wide range of data from census material, local reports and websites to establish the baseline. The predicted changes will then be assessed against the baseline to provide an indication of the likely effect of the development.

6.10.23. The findings and results of the consultation and stakeholder engagement will be used to inform the socio-economic assessment.

Assessment Criteria

6.10.24. The impact assessment methodology is based on the evaluation criteria presented in Table 27. It presents the evaluation criteria that will be used in the assessment for the level of significance in terms of the impact on the economy and community within the study area, including activities, resources, business, and the local population. The impact magnitude can range from positive to negative. The rating of an impact's significance is determined by whether it is categorised as negligible, low, medium or high. In accordance with the EIA Regulations, effects assessed as being of 'high' or 'medium' significance are considered to be significant effects.

6.10.25. This is determined by considering a number of factors including:

- the temporal impact – whether the impact is temporary (up to 5 years duration) or permanent (more than 5 years); and
- the scale of the impact – the number of receptors (incl. people) affected by the impact and therefore how widespread the impact is.

6.10.26. When dealing with communities it is advisable to assume all have a degree of "sensitivity" associated with the Project. In the case of sensitivity it is important to consider the social fabric of the area and consider this and the magnitude of the impact in the evaluation of the significance of effects.

[78] YouGov (2005); www.maestrocard.com/uk/news.html.
[79] English Partnerships (2008) Additionality Guide: A Standard Approach to Assessing the Additional Impact of Interventions http://www.thesroinetwork.org/component/option,com_docman/task,doc_view/gid,30/.
[80] English Partnerships. (2003). Calculating cost per job. Best Practice Note 15. Issue date 30 October 2003. It is generally accepted in economic appraisals of development schemes that 10 person years of employment is the equivalent of one FTE job.

Table 27: Evaluation of Significance Criteria

Impact	Definition
High Negative	Where the extent of impacts on activities, resources, local businesses or the local population is large in scale or magnitude, and a large number of people or activities would be affected.
Medium Negative	Where the extent of impacts on activities, resources, local businesses or the local population is small in scale or magnitude, but a large number of people or activities will be affected. Or alternatively Where the extent of impacts on activities, resources, local businesses or the local population is large in scale or magnitude but only a small number of people or activities would be affected.
Low Negative	Where the extent of impacts on activities, resources, local businesses or the local population is small in scale or magnitude and would only affect a small number of people or activities.
Negligible	No impacts are predicted
Low Positive	Where the extent of impacts on activities, resources, local businesses or the local population is small in scale or magnitude and would only affect a small number of people or activities.
Medium Positive	Where the extent of impacts on activities, resources, local businesses or the local population is small in scale or magnitude, but a large number of people or activities will be affected. Or alternatively Where the extent of impacts on activities, resources, local businesses or the local population is large in scale or magnitude but only a small number of people or activities would be affected.
High Positive	Where the extent of impacts on activities, resources, local businesses or the local population is large in scale or magnitude, and a large number of people or activities would be affected.

Potential Mitigation Measures

6.10.27. There are likely to be a number of benefits which will not require mitigation measures, but rather mechanisms will be investigated to help maximise these benefits of the Project.

6.10.28. The Project has the potential to broaden the local economy with the development of local skills associated with renewable energy production. This is considered to be a beneficial outcome of the Project.

6.10.29. The use of local workforce, services and goods associated with all stages of the development to maximise the economic benefits in the area will be encouraged. RES will be providing details of the Project and opportunities available during the course of the development, and will provide a website for registering interest in providing services to the Project. Further investment in the area could be encouraged as a result of this Project, which could lead to other wider employment opportunities for supplementary services.

6.11. Cumulative Impacts and Interrelated Effects

6.11.1. In line with the EIA Regulations and best practice, the EIA will take into account other existing and committed (awarded planning permission but not constructed) developments and developments currently within the planning system or the marine consenting regime administered by the MMO in the area of the Project, and will consider the cumulative impacts and interrelated effects associated with these developments.

6.11.2. Projects currently known within the planning system and that have been raised by Sefton MBC and Liverpool CC as needing to be considered are presented in Table 28. No information to requests for potential cumulative projects has yet been forthcoming from Wirral BC. As part of the EIA studies, RES will endeavour to identify all potential cumulative projects which are in the planning system or are indeed committed but not yet constructed, taking advice from Sefton MBC, as well as Liverpool CC and Wirral BC, on which projects to include in the assessment. The Projects listed in Table 28 will continue to be reviewed regularly to ensure that all planned and committed developments that could potentially cause a cumulative impact are included within the EIA and reported on in the ES.

6.11.3. It is requested here, that the PINS provides confirmation, through advice from consultees, as to which projects RES should consider in the cumulative assessment.

Table 28: Known existing, committed or planned developments for consideration in Cumulative Impact Assessment

Name of Development	Address	Applicant	Planning Reference No.	Summary of Development	Status
Langton Ro-Ro Terminal	Langton River Berth, Port of Liverpool	Mersey Docks and Harbour Company	N/A – Harbour Revision Order 'The Mersey Docks and Harbour Company (Langton River Berth) Harbour Revision Order 2002 No. 3127	This is a consented, but not built, in-river terminal and has a Harbour Revision Order which dates back to 2002.	Consented
Merlin AFS Store	Seaforth Dock	Mersey Docks and Harbour Company	S/20120413	Erection of an extension to the existing Merlin Animal Feedstuff (AFS) store including the extension of the existing external conveyor system, alterations to the existing vehicular access, alterations to the existing surface water drainage system, relocation of the existing Nature Reserve Offices and relocation of key natural habitat features	Pending
EMR Waste to Energy Plant	Alexandra Branch Dock 1 Regent Road Bootle	Mr Richard Williams, EMR	S/2009/0640	Development of an electricity generation facility on part of the existing metals recycling facility, comprising the erection of steel clad Main Processing Building, Turbine & Boiler Building, Un-processed Materials Storage Building, conveyer belt system, associated plant and machinery and perimeter fencing.	Committed
Seaforth River Terminal (2007 Harbour Revision Order consent)	Royal Seaforth Docks Regent Road Bootle	Mersey Docks And Harbour Company	S/2005/0913	Sefton MBC stated that this not a planning application but is held on the register under this reference. Details of the development include creation of a sea wall and reclamation of land to create new river terminal.	Committed
Erection of 3 warehouse units and the layout of a new rail siding on land East of Regent Road between Strand Road and Nelson Street	Land East of Regent Road Regent Road Bootle	Mr Warren Marshall, MHDC, Maritime Centre, Port of Liverpool Building	S/2011/0057	New planning permission to replace planning permission S/2007/1014 approved 06/03/2008 - for the erection of 3 warehouse units and the layout of a new rail siding on land East of Regent Road between Strand Road and Nelson Street.	Committed
Tobacco Warehouse Stanley Dock	Tobacco Warehouse Stanley Dock Regent	Stanley Dock Properties Ltd	11F/1911	To alter, extend and convert Tobacco Warehouse so as to provide 4,102 sqm of business use	Registered (as per Liverpool CC's

Name of Development	Address	Applicant	Planning Reference No.	Summary of Development	Status
	Road Liverpool L3 0AN			(within Class B1), 3,375 sqm of public exhibition space (within Class D1), 805 sqm of cafe/restaurant/drinking establishments (within Classes A3/A4), 1,015 sqm of retail space (within Class A1), together with 335 no. combined live/work units; to erect an internal multi-level car park for 576 cars and carry out ancillary works associated with the above.	planning application record)
North Warehouse Stanley Dock	North Warehouse Stanley Dock Regent Road Liverpool L3 0AN	Stanley Dock Properties Ltd	12F/0321	To demolish warehouse extension and change use of listed warehouse to 150 no. room hotel (Use Class C1); convert ground floor and basement for hotel use, retail (Class A1) restaurants and bars (Class A3/A4) and gymnasium/leisure uses (Class D2); to install pontoons, carry out landscaping, lay out car parking and associated external works.	Approved with Conditions 26-03-2012
Bramley Moore Dock demolition	Bramley Moore Dock, Liverpool, L3	Peel Land & Property (Ports) Ltd	12C/0173	To demolish transit storage shed on south wayside and brick shed on north wayside so as to enable the comprehensive mixed use redevelopment of land at Liverpool Central and Northern Docks (Liverpool Waters).	Registered (as per Liverpool CC's planning application record) – understood to be the subject of a referral procedure to the SoS
Bath Street and Junction of Dublin Street	Bath Street and Junction of Dublin Street / Regent Road, Liverpool, L3 0BS	Peel Land & Property (Ports) Ltd	12C/0428	To carry out alteration to dock boundary wall in connection with the proposed Liverpool Waters redevelopment scheme, including enlarging an existing opening on Bath Street and the creation of a new opening at the junction of Dublin Street/Regent Road and installation of new gate piers.	Registered (as per Liverpool CC's planning application record)
Liverpool Central & Northern Docks	Liverpool Central & Northern Docks, Liverpool, L3	Peel Land & Property (Ports) Ltd	10C/2425	To demolish transit shed and 2 no. brick sheds at Bramley Moore Dock, so as to enable the comprehensive mixed use redevelopment of land at Liverpool Central and Northern Docks	Registered (as per Liverpool CC's planning application record)

6.12. Environmental effects to be scoped out of the EIA

6.12.1. In preparing this ESR an attempt has been made to also identify those issues that are not considered to be relevant to the assessment. It is proposed that these issues will be 'scoped out' of the assessment subject to agreement with the PINS and consultees. These issues, which are not considered to be significant in the context of the Project, are illustrated within Table 29.

Table 29: Environmental topics proposed to be 'Scoped out'

Topic area	Issue to be scoped out	Rational for scoping out
Dredging	Dredging within the dock linked to ongoing, daily operational activities to allow the ships to access Alexandra Branch Dock No. 3	The berth adjacent to the site at Alexandra Branch Dock No. 3 may require maintenance dredging from time to time to allow access for ships. This activity will be covered by the Port of Liverpool's existing powers and licenses. No capital dredging is planned for the Project.
Shipping Movements	Shipping movements and emissions released as a result of shipping	Increase in shipping is expected to be less than 1% of the current total shipping levels associated with the Port of Liverpool, therefore the increase is not significant. It is not proposed to be assessed in terms of either the impact to Traffic, Transport and Access, or in terms Air Quality and Climate Change.
Estuarine Ecology	Impact of airborne concentrations and deposition of pollutants at locations in the sea or below the mean high water mark	All locations in the sea or below the mean high water mark will be regularly covered and inundated by open water and the impact due to airborne concentrations and deposition of pollutants at these locations would be negligible due to the mass dilution of the sea.
	Installation of the cooling water pipes via float and flood	The float and flood process outlined in para. 2.3.16. minimises contact with the estuary floor, and therefore the environmental impacts.

7. Glossary

Term	Definition	Reference to location in ESR in which it first appears and is defined
oC	Degrees centigrade	Section 2 para. 2.3.9.
ADS	Archaeology Data Service	Section 6.9 para. 6.9.2
ADMS	Atmospheric Dispersion Modelling System	Section 6.2 para. 6.2.9.
Area of Search for Water Cooling Infrastructure	The water cooling infrastructure will be located within this area and will have a much smaller footprint.	Section 3 para. 3.1.1.
AQMAs	Air Quality Management Areas	Section 2 para. 2.3.4.
AQO	Air Quality Objectives	Section 6.2 para. 6.2.25.
As	Arsenic	Section 6.2 para. 6.2.27.
BAP	Biodiversity Action Plan	Section 6.5 para. 6.5.6.
BAT	Best Available Technique	Section 2 para 2.3.9.
BCT	Bat Conservation Trust	Section 6.4 para. 6.4.11.
BFB	Bubbling Fluidised Bed	Section 4 para. 4.5.1.
BGS	British Geological Survey	Section 6.6 para. 6.6.14
CCR	Carbon Capture Ready	Section 4 para. 4.11.1.
Cd	Cadmium	Section 6.2 para. 6.2.27.
CFB	Circulating Fluidised Bed	Section 4 para. 4.5.1.
CHP	Combined Heat and Power	Section 3 para. 3.3.2.
CIRIA	Construction Industry Research and Information Association	Section 6.6 para. 6.6.22.
CNMP	Construction Noise Management Plan	Section 6.3 para. 6.3.15.
CO	Carbon Monoxide	Section 6.2 para. 6.2.2.
CORMIX	A standard thermal plume dispersion model	Section 6.5 para. 6.5.12.
CO2	Carbon Dioxide	Section 2 para. 2.3.13. Table 1
CPO	Compulsory Purchase Order	Section 1 para. 1.2.3.
Cr	Chromium	Section 6.2 para. 6.2.28. Table 6
CRTN	Calculation of Road Traffic Noise	Section 6.3 para. 6.3.25.
CTMP	Construction Transport Management Plan	Section 6.8 para. 6.8.28.
Cu	Copper	Section 6.2 para. 6.2.28. Table 6
dB	Decibel	Section 6.3 para. 6.3.17.
DBA	Desk-Based Assessment	Section 6.9 para. 6.9.19.
DCO	Development Consent Order	Section 1 para. 1.1.1.
DECC	Department for Energy and Climate Change	Section 1 para. 1.2.6.
Desk Study	Geotechnical and Geo-Environmental Desk Study, Alexandra Dock, Liverpool. 27 September 2010. Final Report. Royal Haskoning	Section 3 para. 3.2.4.
DEFRA	Department for Environment, Food and Rural Affairs	Section 6.2 para. 6.2.5.
DMRB	Design Manual for Roads and Bridges	Section 6.9 para. 6.9.29.
DoT	Department of Transport	Section 6.3 para. 6.3.25.

EA	Environment Agency	Section 1 para. 1.4.4.
EALs	Environmental Assessment Levels	Section 6.2 para. 6.2.25.
EC	European Commission	Section 5 para. 5.2.3.
EIA	Environmental Impact Assessment	Section 1 para. 1.1.1.
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009	Section 1 para. 1.1.1.
EMMS	Environmental Management Method Statements	Section 6.6 para. 6.6.23.
EN-1	Overarching National Policy Statement for Energy: A Framework Document for Planning Decisions on Nationally Significant Infrastructure Projects	Section 1 para. 1.2.6.
EN-3	National Policy Statement for Renewable Energy Infrastructure	Section 1 para. 1.2.6.
EP	Environmental Permit	Section 4 para. 4.2.2.
EP Regulations	Environmental Permitting Regulations (England and Wales) 2010	Section 4 para. 4.8.2.
EPUK	Environmental Protection UK	Section 6.2 para. 6.2.13.
ES	Environmental Statement	Section 1 para. 1.2.3.
ESR	Environmental Scoping Report	Section 1 para 1.1.1.
EU	European Union	Section 5 para. 5.2.3.
EWP	Energy White Paper	Section 5 para. 5.2.4.
FRA	Flood Risk Assessment	Section 1 para. 1.2.3.
FTE	Full-Time Equivalents	Section 6.10 para. 6.10.21.
GHG	Greenhouse Gas	Section 5 para. 5.2.2.
Grid Connection Route	Proposed route of the underground cable to connect the Power Island to Bootle Grid Substation extending approximately 2.5 km east from the Power Island	Section 1 para. 1.2.4.
GWh	Gigawatt (thermal)	Section 1 para. 1.1.2.
ha	Hectares	Section 3 para. 3.1.1.
HCl	Hydrogen Chloride	Section 6.2 para. 6.2.28. Table 6
HDD	Horizontal Directional Drilling	Section 2 para. 2.3.17.
HELM	Historic Environment Local Management guidance	Section 6.9 para. 6.9.26.
HER	Historic Environment Record	Section 6.9 para. 6.9.22.
HF	Hydrogen Fluoride	Section 6.2 para. 6.2.28. Table 6
Hg	Mercury	Section 6.2 para. 6.2.28. Table 6
HGV	Heavy Goods Vehicle	Section 6 para. 6.3.7.
HIA	Health Impact Assessment	Section 6.10 para. 6.10.6.
HSE	Health and Safety Executive	Section 4 para. 4.3.3.
IED	Industrial Emissions Directive	Section 4 para. 4.8.2.
IEEM	Institute of Ecology and Environmental Management	Section 6.4 para. 6.4.24.
IEMA	Institute of Environmental Management and Assessment	Section 6.3 para. 6.3.26.
IfA	Institute for Archaeologists	Section 6.9 para. 6.9.26.
IMD2010 / IMD 2007	Indices of Multiple Deprivation	Section 6.10 para. 6.10.14.
Indicative Red Line Boundary	Includes all three components of the Project which make up the application area: the Site, the Grid	Section 3 para. 3.1.1.

	Connection Route, and the Area of Search for Water Cooling Infrastructure	
IOA	Institute of Acoustics	Section 6.3 para. 6.3.26.
IPC	Infrastructure Planning Commission	Section 1 para. 1.2.2.
JNCC	Joint Nature Conservation Committee	Section 6.4 para. 6.4.3.
JSA	Job Seekers Allowance	Section 6.10 para. 6.10.12.
km	Kilometres	Section 2 para. 2.2.4.
LGV	Light Goods Vehicle	Section 6.8 para. 6.8.6.
Liverpool CC	Liverpool City Council	Section 1 para. 1.4.4.
LNR	Local Nature Reserve	Section 6.2 para. 6.2.23. Table 5
LPA	Local Planning Authority	Section 5 para. 5.3.3.
LWS	Local Wildlife Site	Section 6.2 para. 6.2.23. Table 5
LWT	Lancashire Wildlife Trust	Section 6.4 para. 6.4.5.
m	Metre	Section 2 para. 2.3.8.
m3	Cubic metre	Section 6.2 para. 6.2.28. Table 6
MDHC	Mersey Docks & Harbour Company	Section 1 para. 1.4.4.
MEAS	Merseyside Environmental Advisory Services	Section 1 para. 1.4.4.
MMO	Marine Management Organisation	Section 1 para. 1.4.4.
Mn	Manganese	Section 6.2 para. 6.2.28. Table 6
mph	Miles per hour	Section 6.2 para. 6.2.45.
MPHA	Mersey Port Health Authority	Section 6.6 para. 6.6.14.
MWe	Megawatt (electrical)	Section 1 para. 1.1.1.
NAQS	National Air Quality Standards	Section 6.2 para. 6.2.3.
NE	Natural England	Section 1 para. 1.4.4.
NEC	Noise Exposure Categories	Section 6.3 para. 6.3.13.
Ni	Nickel	Section 6.2 para. 6.2.27.
NID	National Infrastructure Directorate	Section 1 para. 1.1.1.
NMP	Noise Monitoring Point	Section 6.3 para. 6.3.2.
NMR	National Monuments Record	Section 6.9 para. 6.9.22.
NNR	National Nature Reserves	Section 6.4 para. 6.4.3.
NO2	Nitrogen Dioxide	Section 6.2 para. 6.2.26.
NOx	Oxides of Nitrogen	Section 6.2 para. 6.2.2.
NPS	National Policy Statements	Section 1 para. 1.2.5.
NPSE	Noise Policy Statement for England	Section 6.3 para. 6.3.10.
NREAP	National Renewable Energy Action Plan	Section 5 para. 5.2.5.
NRL	Noise Rating Level	Section 6.3 para. 6.3.20.
NSIP	Nationally Significant Infrastructure Project	Section 1 para. 1.1.1.
NTS	Non Technical Summary	Section 6 para. 6.1.3.
O3	Ozone	Section 6.2 para. 6.2.27.
ONS	Office of National Statistics	Section 6.10 para. 6.10.8.
PM2.5	Particulates with a radius of less than 2.5 micrometres	Section 6.2 para. 6.2.2.
PM10	Particulates with a radius of less than 10 micrometres	Section 6.2 para. 6.2.2.

PEC	Predicted environmental concentration	Section 6.2 para. 6.2.36. Table 8
PEI	Preliminary Environmental Information	Section 1 para. 1.5.1.
PINS	Planning Inspectorate	Section 1 para. 1.1.1.
PISCES	Prediction of Inshore Saline Community by Expert System	Section 6.5 para. 6.5.8.
Power Island	Proposed power plant area, which includes the combustion and power generation equipment, and the fuel reception and storage area are located on the now infilled former Hornby Dock	Section 3 para 3.1.1.
PPG	Planning Policy Guidance	Section 5 para. 5.3.1.
PPS	Planning Policy Statement	Section 5 para. 5.3.1.
pRAMSAR	Proposed RAMSAR site	Section 3 para. 3.3.8.
Project	Renewable Energy Project with capacity to generate 150 MWe at the Port of Liverpool on the site of the now infilled former Hornby Dock, adjacent to the Alexandra Branch Dock No. 3, with development of associated infrastructure extending into the Mersey Estuary and inland to Bootle Grid Substation	Section 1 para. 1.1.1.
PROW	Public Rights of Way	Section 6.10 para. 6.10.5.
pSPA	Proposed Special Protected Area	Section 3 para. 3.3.8.
RES	RES UK & Ireland Ltd	Section 1 para. 1.1.1.
rMCZ	recommended Marine Conservation Zones	Section 6.5 para. 6.5.4.
RPA	Radiological Protection Advisor	Section 6.6 para. 6.6.15.
RSS	Regional Spatial Strategy	Section 5 para. 5.3.1.
SAC	Special Area of Conservation	Section 6 para. 6.2.21.
Sb	Antimony	Section 6.2 para. 6.2.28. Table 6
Sefton MBC	Sefton Metropolitan Borough Council	Section 1 para. 1.4.4.
Site	Now infilled former Hornby Dock, adjacent to the Alexandra Branch Dock No. 3	Section 1 para. 1.1.1.
SNCI	Sites of Nature Conservation Importance	Section 6.4 para. 6.4.4.
SO2	Sulphur Dioxide	Section 6.2 para. 6.2.2.
SoCC	Statement of Community Consultation	Section 1.2 para. 1.2.3.
SoS	Secretary of State	Section 1 para. 1.2.2.
SPA	Special Protection Areas	Section 6.2 para. 6.2.21.
SSSI	Site of Special Scientific Interest	Section 3 para. 3.3.8.
SSTLs	Site Specific Target Levels	Section 6.6 para. 6.6.20. Table 15
TA	Transport Assessment	Section 6.8 para. 6.8.15.
TAG	Transport Analysis Guidance	Section 6.9 para. 6.9.29.
tpa	Tonnes per annum	Section 1 para. 1.1.4.
TVIA	Townscape and Visual Impact Assessment	Section 6.7 para. 6.7.1.
UDP	Unitary Development Plan	Section 5 para. 5.3.1.
µg	Microgram	Section 6.2 para. 6.2.28. Table 6
UK	United Kingdom	Section 1 para. 1.8.1.
UK AIR	UK Air Information Resource	Section 6.2 para. 6.2.5.
UK APIS	UK Air Pollution Information System	Section 6.2 para. 6.2.8.

UNESCO	United Nations, Educational, Scientific and Cultural Organisation	Section 6.9 para. 6.9.5.
USA	United States of America	Section 1 para. 1.8.1.
V	Vanadium	Section 6.2 para. 6.2.28. Table 6
VOCs	Volatile Organic Compounds	Section 6.2 para. 6.2.29.
West Lancs BC	West Lancashire Borough Council	Section 1 para. 1.5.1.
WHO	World Health Organisation	Section 6.3 para. 6.3.14.
WHS	World Heritage Site	Section 6.7 para. 6.7.4.
WID	Waste Incineration Directive	Section 4 para. 4.8.2.
Wirral BC	Wirral Borough Council	Section 1 para. 1.4.4.
ZTV	Zone of Theoretical Visibility	Section 6.7 para 6.7.16.

8. Figures

KEY:

Site boundary
(RES Drawing Ref: 02684D2503-01)

Area of search for cooling water infrastructure

REV.	*DESCRIPTION*	*DATE*

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 1

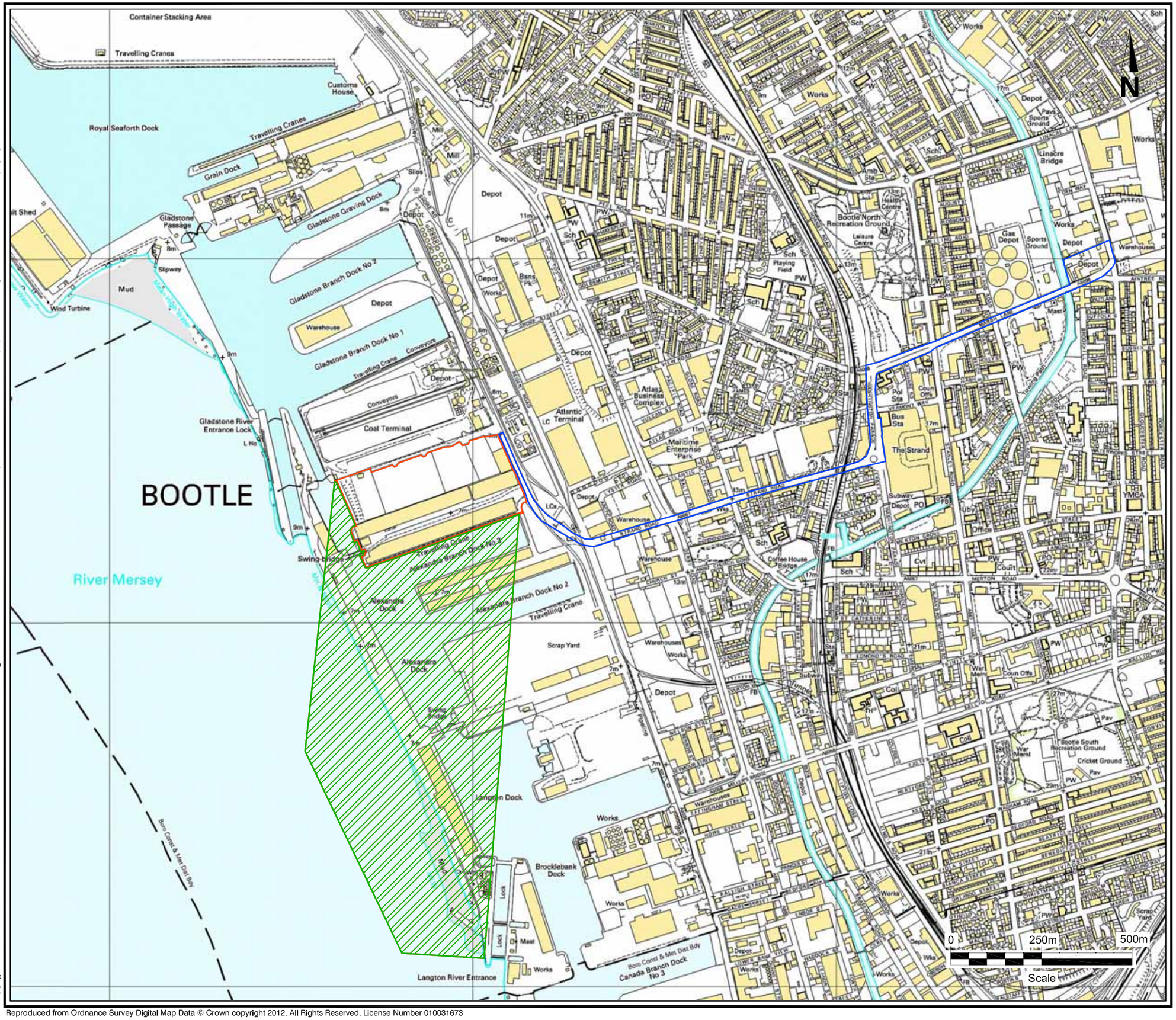
SITE LOCATION PLAN

SCALE	*PROJECT CODE*
1:25,000 (@A3)	JE30117
AUTHOR	*DRAWN*
LW	ARR
CHECKED	*DATE*
	FEB 2011

SINCLAIR KNIGHT MERZ SKM ENVIROS

File name: Arr2731_A.dwg Plot date: Mar 08, 2012 - 3:22pm Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\A\JE30117\Scoping Figures\

Figure 1a Zoned Project Areas



KEY:

- Preliminary site boundary
- Area of search for cooling water infrastructure
- Indicative grid connection route

Note:
Area boundary information provided by RES
Drawing Ref: 02684D2503-01)

REV.	*DESCRIPTION*	*DATE*

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

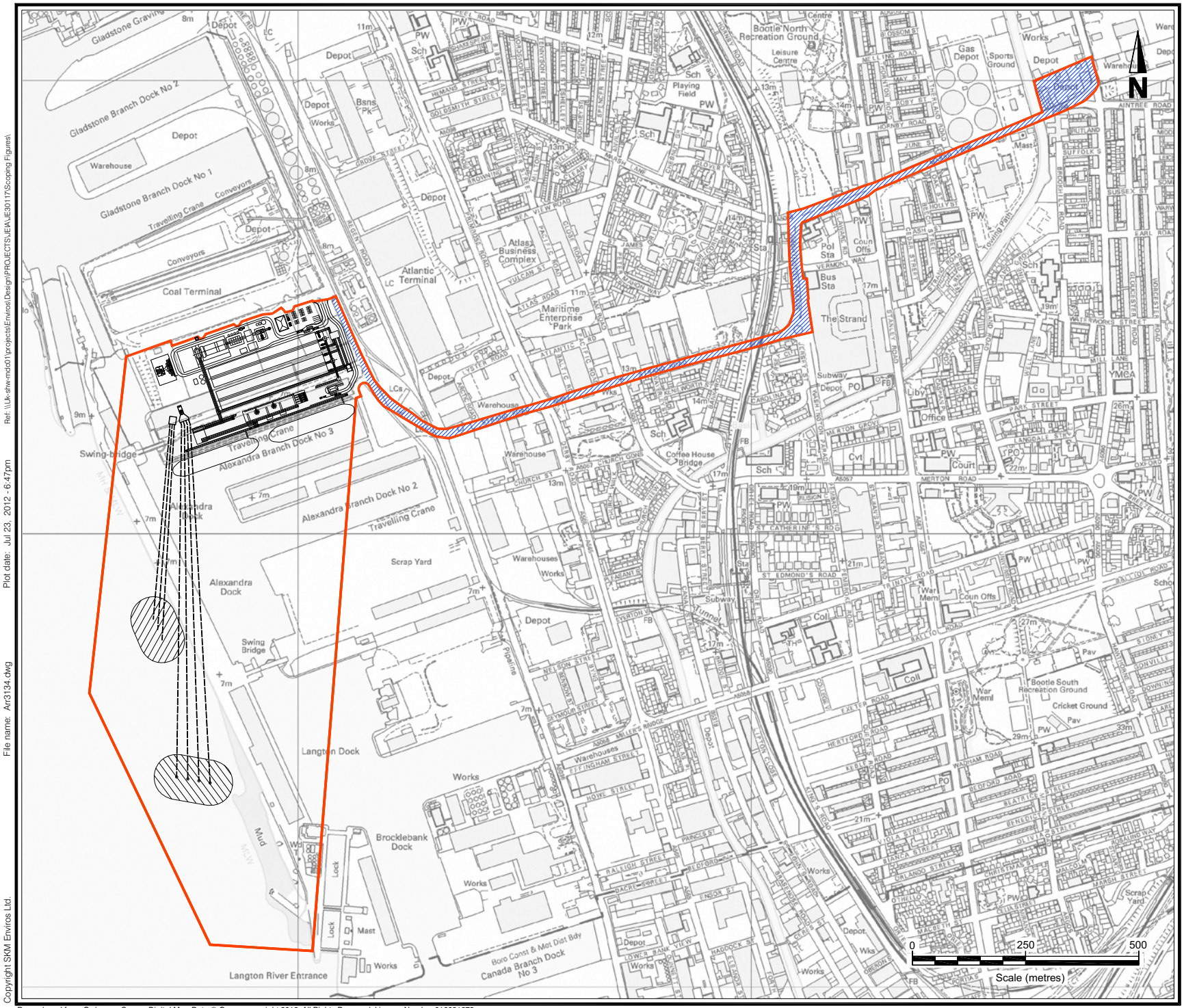
FIGURE No / TITLE

FIGURE 1a

ZONED PROJECT AREAS

SCALE	*PROJECT CODE*
1:10,000 (@A3)	JE30117
CONTENT	*DRAWN*
LW	ARR
CHECKED	*DATE*
	MAR 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS



KEY:

- Preliminary project boundary (RES Drawing Ref: 02684D2206-03)
- Preliminary project infrastructure (RES Drawing Ref: 02684D1001-03)
- Cooling water infrastructure (Underground pipes) (RES Drawing Ref: 02684D1001-03)
- Area required for construction
- Indicative grid connection route (RES Drawing Ref: 02684D2503-01)

REV.	DESCRIPTION	DATE

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

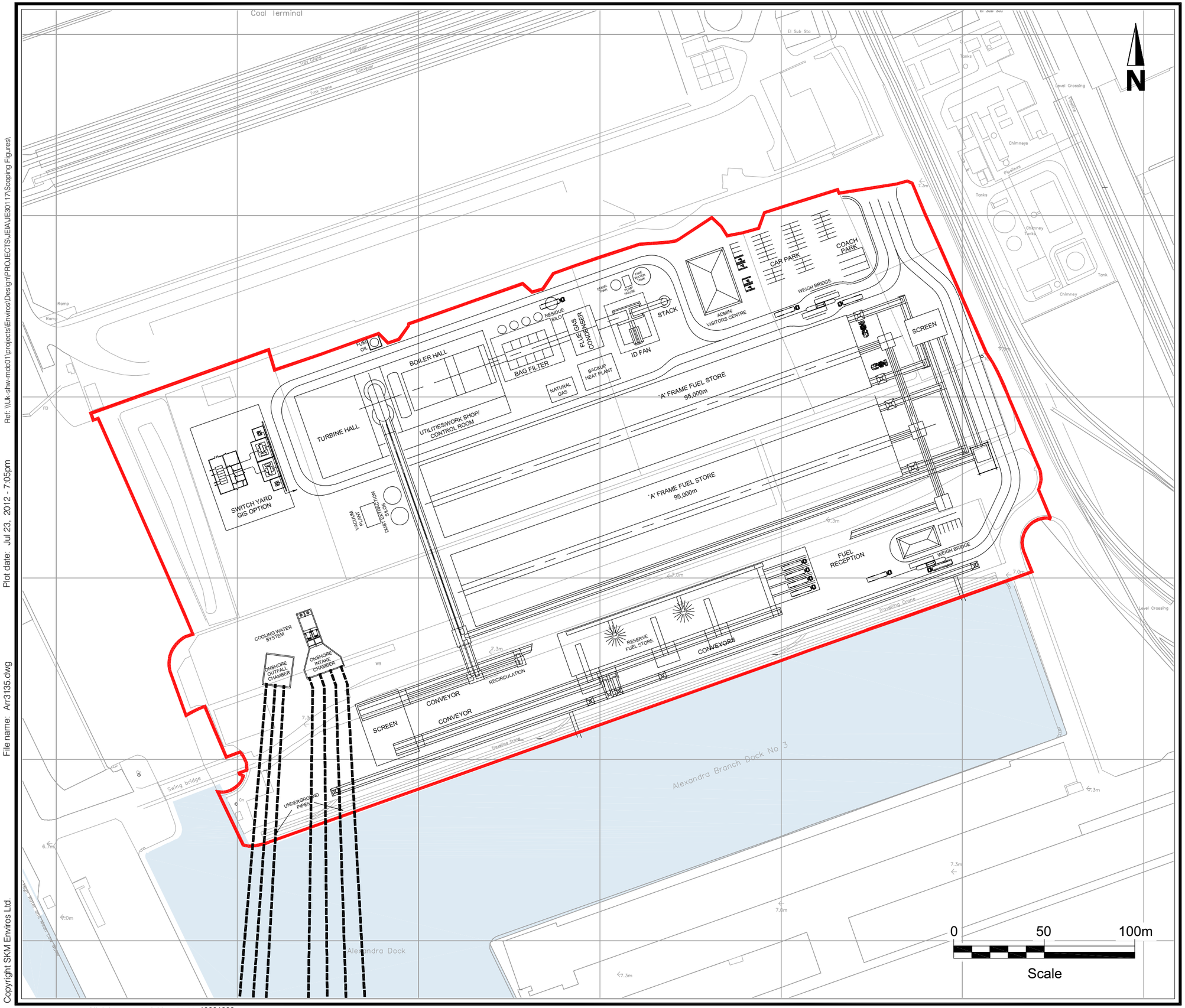
FIGURE 2

INDICATIVE PROJECT INFRASTRUCTURE LAYOUT

SCALE	PROJECT CODE
1:8,000 (@A3)	JE30117
CONTENT	**DRAWN**
LW	ARR
CHECKED	**DATE**
VH	JULY 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS

Figure 2a Indicative Site Layout



KEY:

- Preliminary site boundary (RES Drawing Ref: 02684D2503-01)
- Preliminary project infrastructure (Fichtner Drawing Ref: 1297-002-A10)
- Cooling water infrastructure (Underground pipes) (RES Drawing Ref: 02684D1001-03)

REV. *DESCRIPTION* *DATE*

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 2a

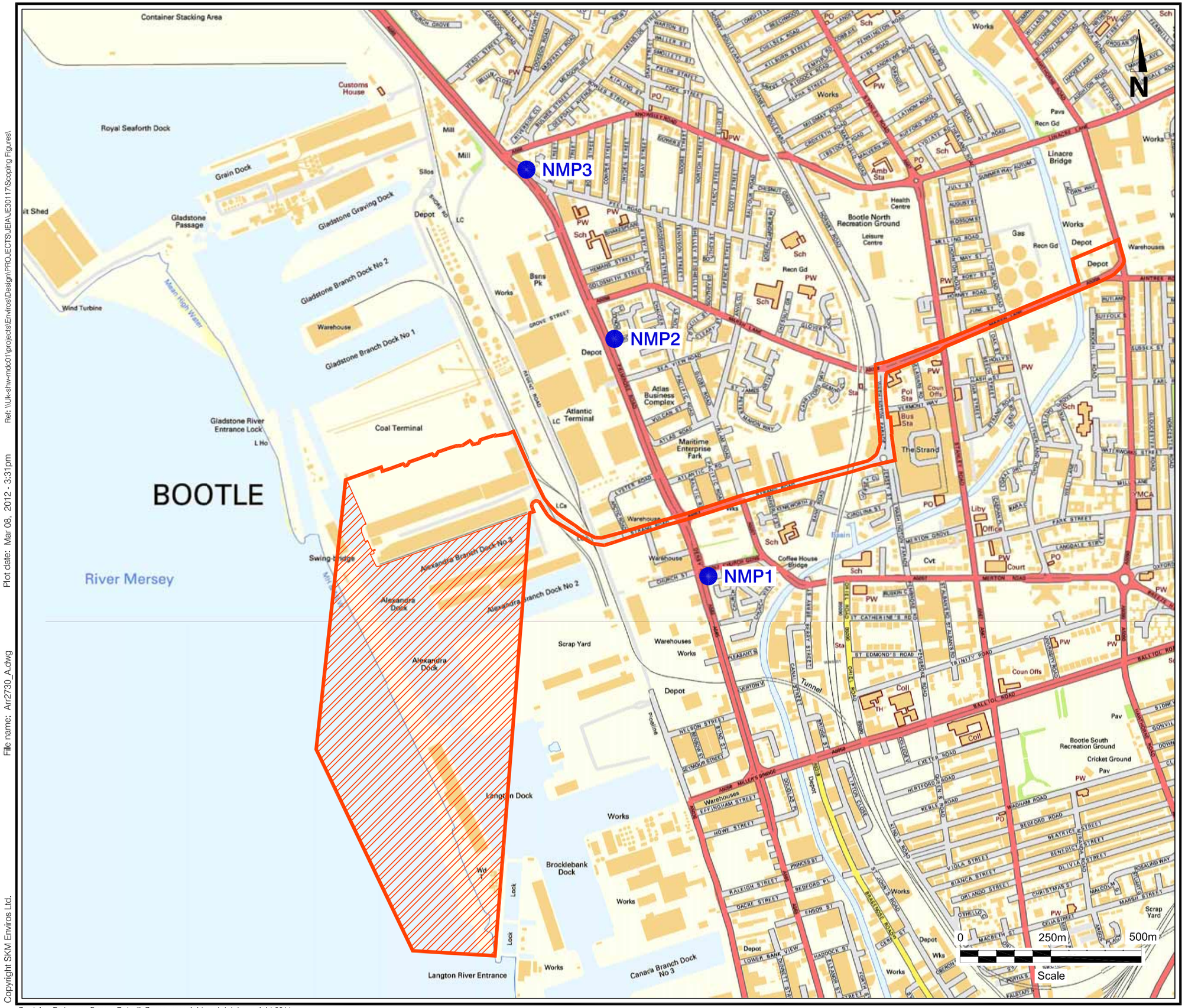
INDICATIVE SITE LAYOUT

SCALE	*PROJECT CODE*
1:2000 (@A3)	JE30117
CONTENT	*DRAWN*
LW	ARR
CHECKED	*DATE*
VH	JULY 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS

Plot date: Jul 23, 2012 - 7:05pm
File name: Arr3135.dwg
Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\AJE30117\Scoping Figures\

Figure 3 Noise Receptor Locations and Monitoring Points



KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure
- NMP1 Noise monitoring point

REV.	DESCRIPTION	DATE

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 3

NOISE RECEPTOR LOCATIONS AND MONITORING POINTS

SCALE	PROJECT CODE
1:10,000 (@A3)	JE30117
CONTENT	DRAWN
SUr	ARR
CHECKED	DATE
	FEB 2011

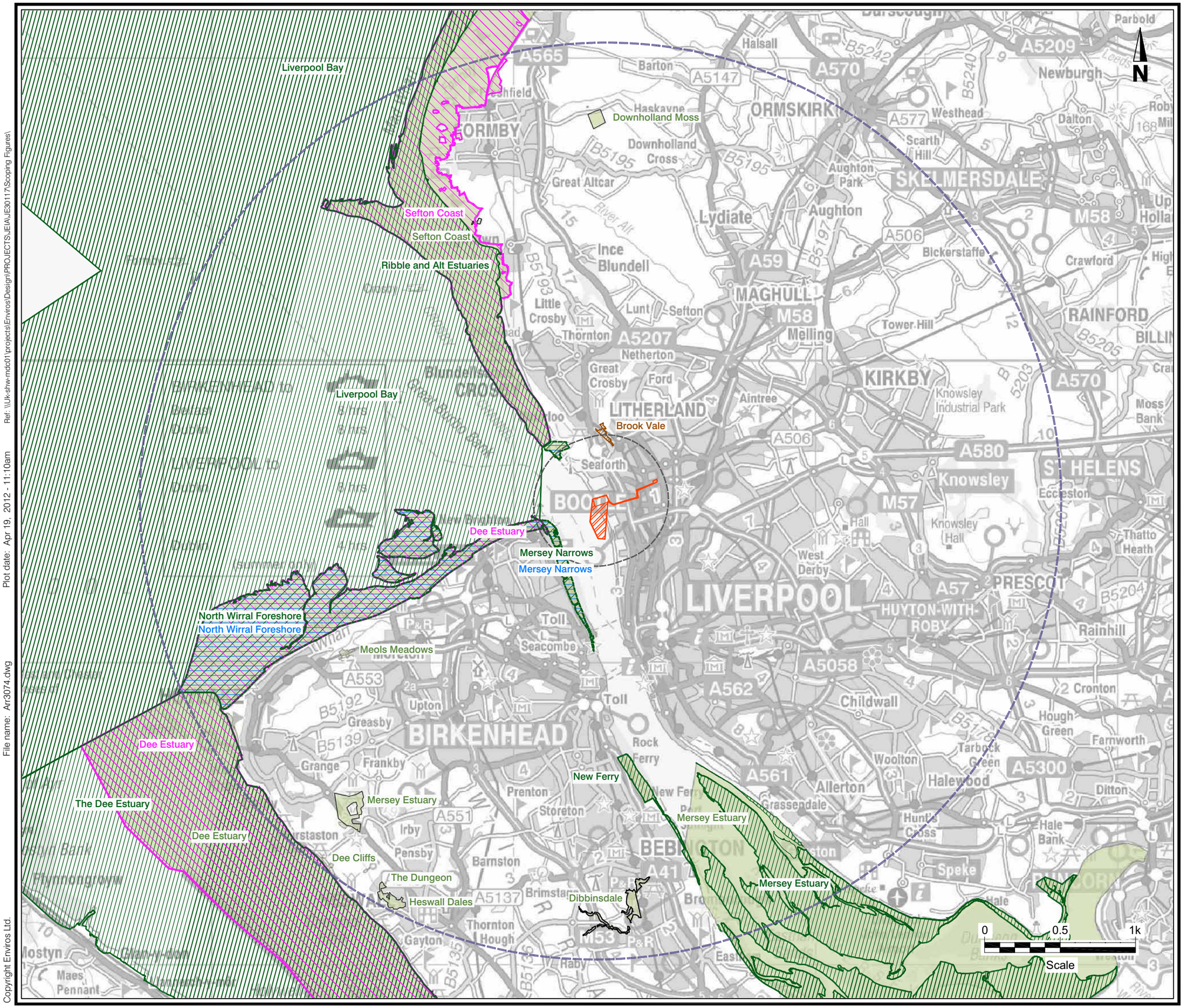
SINCLAIR KNIGHT MERZ SKM ENVIROS

File name: Arr2730_A.dwg

Plot date: Mar 08, 2012 - 3:31pm

Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\A\JE30117\Scoping Figures\

Figure 4 Ecological Designations



KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure
- 2k buffer
- 15k buffer
- Special Protection Areas
- Proposed Special Protection Area
- Proposed Ramsar
- Special Areas of Conservation
- SSSI
- Local Nature Reserve

REV.	*DESCRIPTION*	*DATE*

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 4

ENVIRONMENTAL DESIGNATIONS

SCALE	*PROJECT CODE*
1:120,000 (@A3)	JE30117
AUTHOR	*DRAWN*
LW	ARR
CHECKED	*DATE*
	FEB 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS

Plot date: Apr 19, 2012 - 11:10am
File name: Arr3074.dwg
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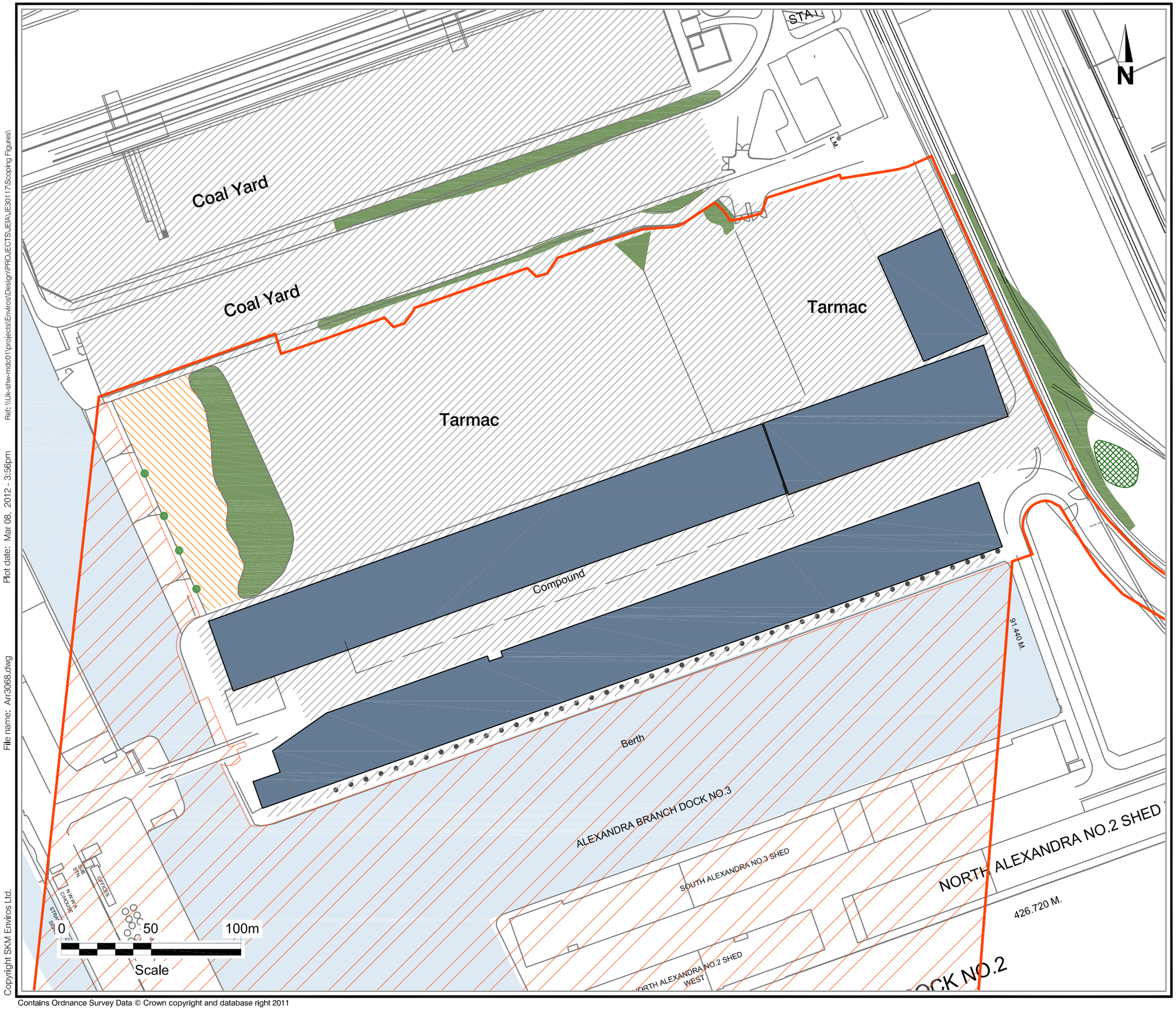


KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure
- Ephemeral/short perennial
- Tall ruderal
- Scrub
- Scattered trees
- Sea water (brackish)
- Hardstanding
- Buildings

REV.	DESCRIPTION	DATE

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

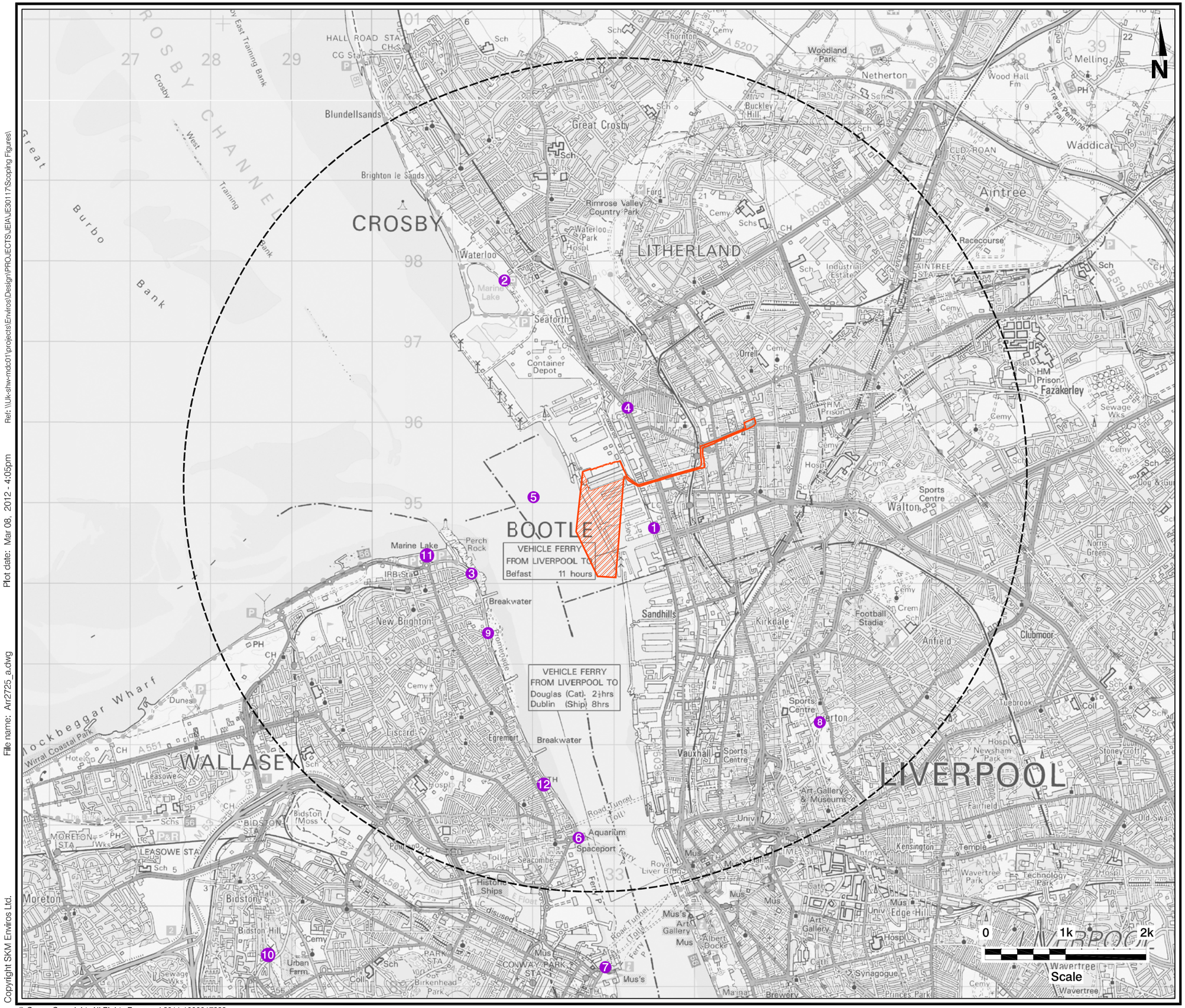
FIGURE 5

PHASE 1 HABITAT SURVEY

SCALE	*PROJECT CODE*
1:2000	JE30117
AUTHOR	*DRAWN*
DW	ARR
CHECKED	*DATE*
	JAN 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS

Figure 6 Proposed Landscape Viewpoints



KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure
- 5km buffer

Proposed Viewpoints	Grid Reference
1 Liverpool Irish Ferry Terminal, Gladstone Dock, Bootle	333506,394692
2 Car Park at Marine Lake, Crosby	331649,397765
3 Lifeguard Station and Slipway, Marine Promenade, New Brighton	331240,394126
4 Junction of Peel Road and Primrose Road	333177,396185
5 Isle of Man Ferry	332010,395075
6 Seacombe Ferry Terminal	332570,390845
7 Woodside Ferry Terminal	332902,389244
8 Everton Park Viewpoint	335564,392281
9 Vale Park Pedestrian Shelter, Wallasey	331445,393387
10 Bidston Hill, Birkenhead	328715,389392
11 Marine Lake, New Brighton	330687,394352
12 Wallasey Town Hall	332138,391507

REV.	DESCRIPTION	DATE

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 6

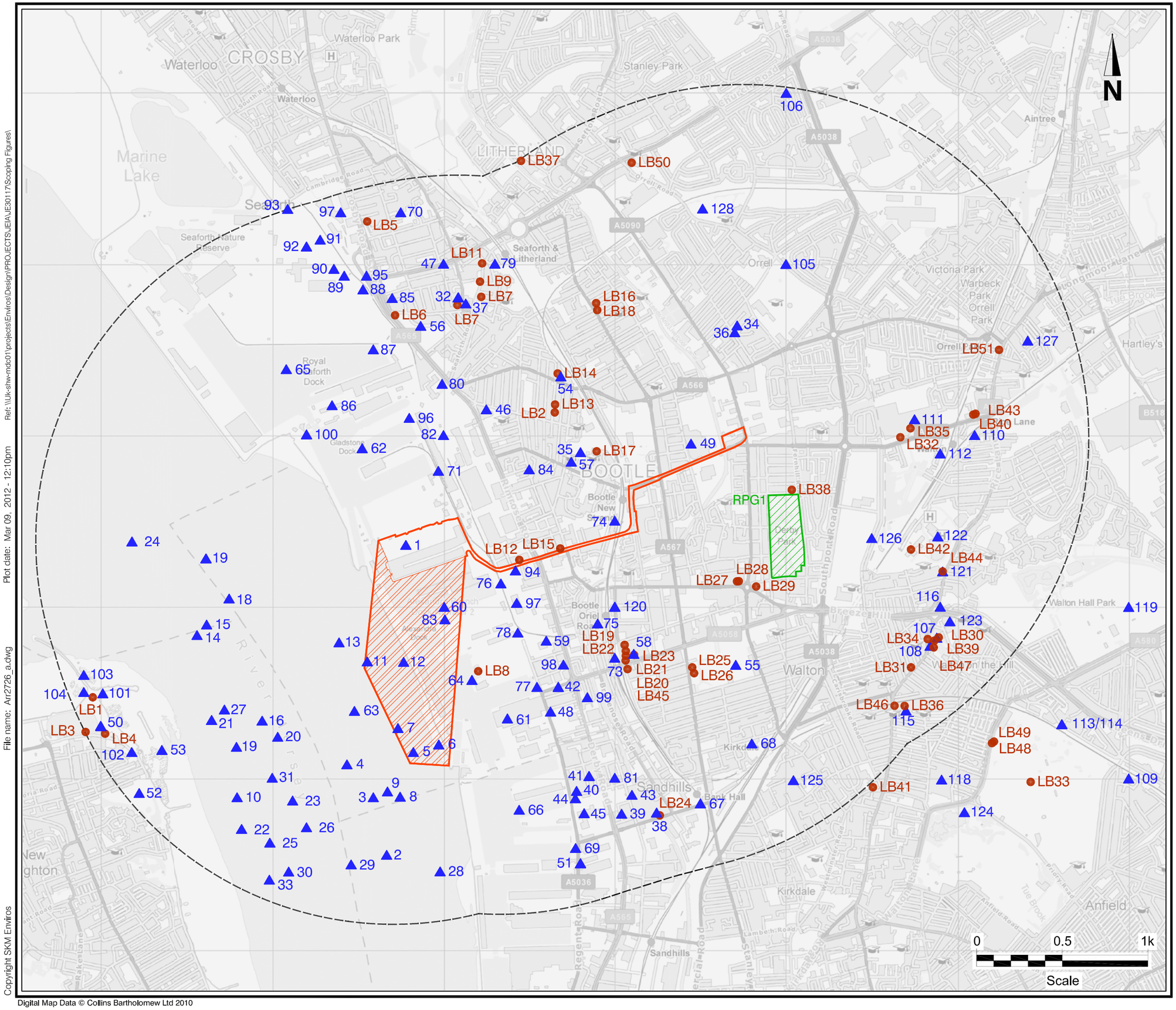
PROPOSED LANDSCAPE VIEWPOINTS

SCALE	*PROJECT CODE*
1:45,000	JE30117
AUTHOR	*DRAWN*
LR	ARR
CHECKED	*DATE*
	FEB 2011

SINCLAIR KNIGHT MERZ SKM ENVIROS

Plot date: Mar 08, 2012 - 4:05pm
File name: Arr2725_a.dwg
Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\AJE30117\Scoping Figures\

Figure 7 Archaeological and Cultural Heritage Designations



Digital Map Data © Collins Bartholomew Ltd 2010

Plot date: Mar 09, 2012 - 12:10pm
File name: Arr2726_a.dwg
Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\A\JE30117\Scoping Figures\
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Document Ref: 02684-001317 Issue: 01

KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure
- 2k buffer from the site and grid connection route
- Listed buildings
- Archaeological sites and features
- Registered Parks and Gardens

REV.	*DESCRIPTION*	*DATE*

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

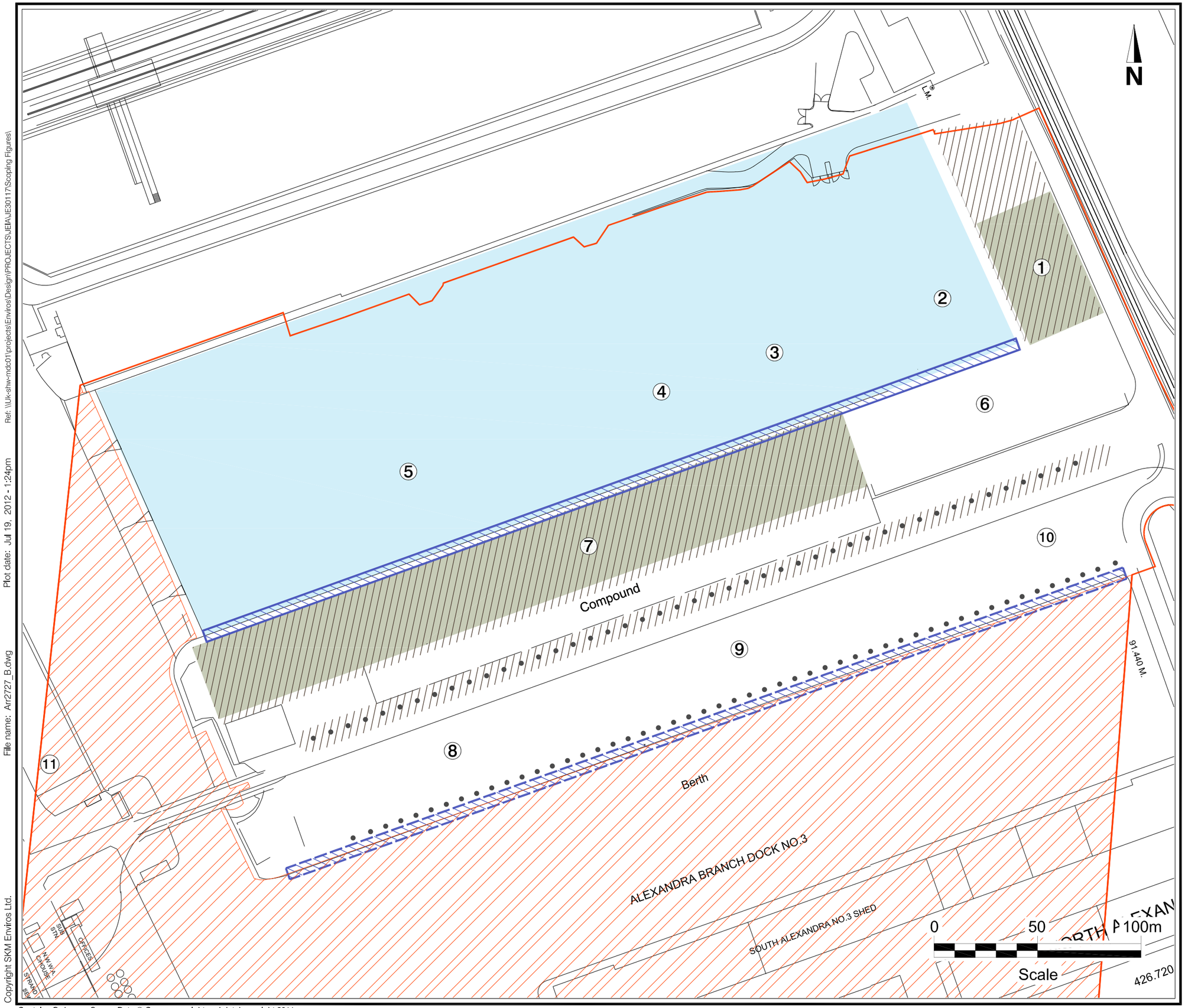
FIGURE No / TITLE

FIGURE 7

ARCHAEOLOGICAL AND CULTURAL HERITAGE DESIGNATIONS

SCALE	*PROJECT CODE*
1:21,000 (@A3)	JE30117
AUTHOR	*DRAWN*
RTL	ARR
CHECKED	*DATE*
	FEB 2011

SINCLAIR KNIGHT MERZ SKM ENVIROS



Contains Ordnance Survey Data © Crown copyright and database right 2011

KEY:

- Site boundary (RES Drawing Ref: 02684D2503-01)
- Area of search for cooling water infrastructure

Areas of the Site (according to 2010 RES desk study)

1. East Hornby Shed
2. Maritime Transport Site
3. P&O Ferries Lorry Park Site
4. AAA Car Auction Site
5. JMD Haulage Contractor's Site
6. Cargill Grain Shed
7. Henry Bath Metals Shed
8. Alexandra Quay West Shed
9. Alexandra Quay Central Shed
10. Alexandra Quay East Shed
11. West Hornby Shed, Gladstone Lock & River Wall

Features of Potential Archaeological or Historical Importance

- Areas of cobbling
- Quay walls and associated moring bollards
- Former Hornby dock now infilled
- Buildings of possible historical importance
- Rail sidings

Note:
All locations and extent of areas are approximate.

REV.	DESCRIPTION	DATE

PROJECT TITLE

ALEXANDRA DOCK BIOMASS PROJECT

FIGURE No / TITLE

FIGURE 8

FEATURES IDENTIFIED WITHIN THE SITE BOUNDARY

SCALE	PROJECT CODE
1:1750	JE30117
AUTHOR	**DRAWN**
RTL	ARR
CHECKED	**DATE**
VH	JULY 2012

SINCLAIR KNIGHT MERZ SKM ENVIROS

File name: Arr2727_B.dwg
Plot date: Jul 19, 2012 - 1:24pm
Ref: \\Uk-shw-mdc01\projects\Enviros\Design\PROJECTS\JE\AJE30117\Scoping Figures\

9. Appendices

Alexandra Dock Renewable Energy Project
Environmental Scoping Report

Appendix A Preliminary Air Quality Assessment

SKM ENVIROS

RES UK & IRELAND LTD

PRELIMINARY AIR QUALITY ASSESSMENT

- Final Report
- 08 July 2011

RES UK & IRELAND LTD

PRELIMINARY AIR QUALITY ASSESSMENT

- Final Report
- 08 July 2011

SKM Enviros
Enviros House
Shrewsbury Business Park
Sitka Drive
Shrewsbury
Shropshire SY2 6LG
Tel: +44 (0)1743 284 800
Fax: +44 (0) 1743 245 558
Web: www.skmenviros.com

Contents

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Version 2	18/05/2011	Alun McIntyre	Vicki Heron	18/05/2011	Draft for internal review
Version 3	19/05/2011	Alun McIntyre	Vicki Heron	19/05/2011	Draft for client review
Version 4	01/07/2011	Alun McIntyre	Vicki Heron	01/07/2011	Second draft for internal review
Version 5	05/07/2011	Laura Woods	Vicki Heron	01/07/2011	Second draft for internal review
Version 6	08/07/2011	Alun McIntyre	Vicki Heron	08/07/2011	Final

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Last saved:	8 July 2011 09:07 AM
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Author:	Gary Wilson
Project manager:	Vicki Heron
Name of organisation:	RES UK & IRELAND LTD (RES)
Name of project:	Alexandra Dock Renewable Energy Project
Name of document:	Preliminary Air Quality Assessment
Document version:	Final
Project number:	JE30117

Executive Summary

This preliminary air quality assessment has been carried out for the proposed RES UK & Ireland Ltd (RES) biomass project at Alexandra Dock, in Bootle.

There are three aspects that have been considered in this assessment. These are as follows:

- Determine a suitable stack height for the 100 MWe and 150 MWe plants;
- Assess the air quality impact of a 100 MWe and 150 MWe plant to determine which of these plants is considered to be most suitable; and
- Consider the cumulative impact of the 100 MWe and 150 MWe with another proposed biomass plant, Project X, at the Port.

Overall, the impact of emissions to air from the proposed biomass plant, incorporating a recommended stack height of 105m, are likely to be acceptable for both the 100 MWe and 150 MWe plant when operating in isolation and in combination with Project X.

1. Introduction

1.1. Study Outline

A preliminary air quality assessment has been carried out for the proposed biomass project at Alexandra Dock, in Bootle.

At present, RES are considering the options of two sized plants: a 100 MWe and a 150 MWe biomass plant.

There are three aspects that have been considered in this assessment. These are as follows:

- Determine a suitable stack height for the 100 MWe and 150 MWe plants;
- Assess the air quality impact of a 100 MWe and 150 MWe plant to determine which of these plants is considered to be most suitable; and
- Consider the cumulative impact of the 100 MWe and 150 MWe with another proposed biomass plant, Project X, at the Port.

It should be noted that this is a preliminary assessment to support the environmental scoping report and initial consultations. A full air quality assessment, including a detailed methodology, will be provided in the Environmental Statement for the proposed biomass plant.

1.2. Report layout

Chapter 2 of this report gives the study methodology and dispersion model inputs for the stack height assessment, assessment of the proposed site alone and the cumulative assessment of the proposed site in combination with Project X. The results of the various assessments are provided in Chapter 3 with the discussion of the results in Chapter 4. In Chapter 5 conclusions from the study are provided.

2. Methodology

This section outlines the methodology for assessing the potential effects of air quality emissions on the environment. It provides a description of the air quality modelling used for this preliminary assessment to assess the main point source of process emission (i.e. the boiler chimney stack) from the proposed facility.

2.1. Dispersion Modelling

The main approach used to assess emissions to air from the Project via the main stack was an atmospheric dispersion modelling technique. A current UK industry standard atmospheric dispersion model, ADMS (Version 4.2), was used. A description of ADMS is given below.

The modelling procedure is summarised as follows:

- information on the Project's operational parameters for the various fuel types, emission point location and design and building layout are obtained, together with information on emissions (flow rates and concentrations) from the main stack;
- meteorological data is collected and in this instance were provided by the Met Office[1];
- a receptor grid is identified for which airborne concentrations of released substances were modelled. This comprised a grid extending approximately 5 km by 5 km in an east-west and north-south direction, centred on the Facility Site. A grid of this size is sufficient to ensure that the highest concentrations forecast to occur as a result of emissions from the main stack are covered in the model domain. Concentrations were calculated at 50 m intervals within the grid. This gave a total of 10,201 calculation points for each pollutant. In addition, concentrations were modelled at the Sefton Metropolitan Borough Council (SMBC) nitrogen dioxide diffusion tube monitoring locations contained within the SMBC Air Quality Management Areas (AQMA);
- the dispersion model is run to provide calculated ground-level concentrations of the released substances due to the Project's process emissions. Interpretation of the results was based on the highest modelled concentration at any off-site location. The post-processing of the results files produced by ADMS 4.2 was carried out using Microsoft Excel;
- information is gathered on baseline levels of air quality – that is, the levels of air pollutants which arise in the absence of the Project. The information on baseline air quality is obtained from the local authority and national air monitoring records;
- the modelled concentrations of pollutants due to emissions from the main stack are combined with the baseline concentrations of air pollutants in the vicinity of the Project; and

1 Met Office, hourly sequential data for the Crosby Weather Station, for years 2005-2007, inclusive

- the modelled airborne contribution of each substance released from the process is referred to as the "Process Contribution" (PC). The combined concentration due to the PC and baseline levels of airborne pollutants is referred to as the Predicted Environmental Concentration (PEC). Both PC and PEC values were assessed against the relevant UK air quality objectives and air quality guidelines (set out below).

Further details about the dispersion model input data are provided in Appendix 1.

2.2. Emissions Data

Information on the model inputs, study parameters and site layouts were provided by Fichtner Consulting Engineers Ltd[2].

The plant will be able to handle a variety of fuel blend. As the final fuel blend has not yet been confirmed, the assessment is based on the worst case fuel blend scenario that would result in the highest predicted ground level concentrations of air pollutants. An initial modelling study confirmed that Case 2, 100% wood pellets, results in the highest predicted ground level concentrations. Therefore, this preliminary assessment is based on the biomass plant utilising 100% wood pellets as the fuel.

This preliminary assessment focuses on the emissions of oxides of nitrogen and PM_{10}, as these are the pollutants of main concern in Bootle due to current exceedance of the relevant air quality objectives. Emissions of sulphur dioxide have also been included in the assessment. A summary of the emissions data, for Case 2 (100% wood pellets), included in the assessment is shown in Table 1. The emission concentrations and mass release rates are set out in Table **2**.

Project X is another proposed biomass plant on at the Port. At this stage there is no available information on Project X apart from its approximate location but does require consideration in this assessment. To get an idea on the potential cumulative impact of both sites the input data for Project X has been assumed to be the same as the 150 MWe plant.

2 Fichtner Consulting Engineers Limited, S1297-0012-0042VBT Input Assumptions for Air Quality Modelling, 6th April 2011

Table 1 Emission Parameters for the Main Boiler Stack

Parameter	Value			Units
	100 MWe	150 MWe	Project X	
Easting	332880	332861	333482	Metres (m)
Northing	395377	395367	393220	Metres (m)
Stack Height	Various	Various	Various	Metres (m)
Vertical velocity at actual conditions	15.0	15.3	15.3	Metres per second (m/s)
Stack discharge diameter	3.7	4.5	4.5	Metres (m)
Temperature	140	140	140	Degrees Celsius (^oC)
Volume flow (at reference conditions of 273K, 11% oxygen, dry gas)	161	241	241	Normalised cubic metres per second (Nm^3/s)
Volume flow (at release conditions)	162	243	243	Cubic metres per second (m^3/s)
Moisture Content (at release conditions)	11.9	11.9	11.9	Percentage (%)
Oxygen Content (at release conditions)	4.0	4.0	4.0	Percentage (%)

Table 2 Emission Concentrations for the Main Boiler Stack

Substance	100 MWe		150 MWe		Project X	
	Emission concentration (mg/Nm^3 except where stated)[1]	Release rate (g/s)	Emission concentration (mg/Nm^3 except where stated)[1]	Release rate (g/s)	Emission concentration (mg/Nm^3 except where stated)[1]	Release rate (g/s)
Oxides of nitrogen	133	21.39	100	24.12	100	24.12
Sulphur dioxide	50	8.04	50	12.06	50	12.06
Particulates (PM10)	10	1.61	10	2.41	10	2.41

Note 1: Concentrations given at reference conditions: 273K, 101.3kPa, 11% oxygen on a dry basis

The dispersion modelling study was carried out on the basis that substances could potentially be emitted at concentrations up to these emission limits. Emissions were assumed to be continuously at these limits to ensure that a worst case approach has been adopted. There are likely to be frequent periods when the emissions from the Project will be less than the specified emission limits.

It was also assumed that the boiler plant will operate continuously at maximum load for the entire year. Due to periods of shut-down and maintenance the plant is expected to operate for approximately 85% of the year.

2.3. Air Quality Objectives

In the UK, both statutory and non-statutory air quality objectives and guidelines exist. The statutory air quality objectives are referred to as Air Quality Objectives (AQO) and are set out in the Air Quality Standards[3]. Air quality in compliance with these AQOs is considered to have no significant adverse effects on health or the environment[4]. Air pollutant concentrations in excess of these objectives could potentially have an adverse effect, although a considerable "margin of safety" is built into many of the guidelines. A summary of the AQOs relevant to this preliminary assessment are given in Table **3**.

Table 3 Air Quality Objectives

Pollutant	Concentration ($\mu g/m^3$)	Measured as
Nitrogen dioxide	40	Annual mean
	200	1 hour mean not to be exceeded more than 18 times per year (equivalent to the 99.8th percentile)
Particles (PM_{10})	50	24 hour mean not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile)
	40	Annual mean
Sulphur dioxide	350	1 hour mean not to be exceeded more than 24 times per year (equivalent to the 99.7th percentile)
	125	24 hour mean not to be exceeded more than 3 times per year (equivalent to the 99.2nd percentile)
	266	15 minute mean not to be exceeded more than 35 times per year (equivalent to the 99.9th percentile)

3 Statutory Instrument 2010 No. 1001. Environmental Protection. The Air Quality Standards Regulations 2010
4 Defra, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (p13), Volume 1, July 2007

2.4. Baseline Conditions

Baseline air quality is the concentration of air pollutants that are present in the absence of the proposed biomass plants. Baseline air quality results from other sources including: traffic, other industrial / commercial activity, residential premises, agricultural activities, and natural sources.

Concentrations of substances emitted from the biomass plant are combined with baseline concentrations to derive the Predicted Environmental Concentration (PEC).

Information on baseline air quality in the vicinity of the Project was obtained or derived from a range of sources. Where local air quality monitoring data were available, this information was reviewed. Where no local information was available, other appropriate sources of information were reviewed to obtain a representative assessment of local background air quality.

The following sources of information have been used to obtain information on baseline air quality:

- maps of background concentrations for each 1 km x 1 km grid square in the UK produced by Defra and available via the UK Air Quality Archive[5]. These estimates are based upon the principal local and regional sources of emissions, and ambient monitoring data. The grid square covering the Facility Site location and the maximum concentration from all grid squares covering the study area were included; and
- the SMBC air quality monitoring programme[6].

Table 4 Baseline Air Quality

Substance	Baseline concentration ($\mu g/m^3$)	Basis
Nitrogen dioxide	37.4	Measured annual mean concentration in 2010 at St Joan of Arc School, Rimrose Road, Bootle continuous automatic monitoring station. This value was doubled to obtain the short term baseline concentration
Sulphur dioxide	7.05	Maximum value from Defra background mapping for the SMBC area for 2010. This value was doubled to obtain the short term baseline concentration
PM_{10}	22.4	Measured annual mean concentration in 2010 at St Joan of Arc School, Rimrose Road, Bootle continuous automatic monitoring station.
	31.5	Measured 90.4th percentile of daily mean PM_{10} concentration in 2010 at St Joan of Arc School, Rimrose Road, Bootle continuous automatic monitoring station.

5 DEFRA, UK Air: Air Information Resource, accessed at http://uk-air.defra.gov.uk/, April 2011
6 Sefton Metropolitan Borough Council, Breathing Space - local air quality management and air pollution monitoring, accessed at www.sefton.gov.uk, April 2011

3. Results

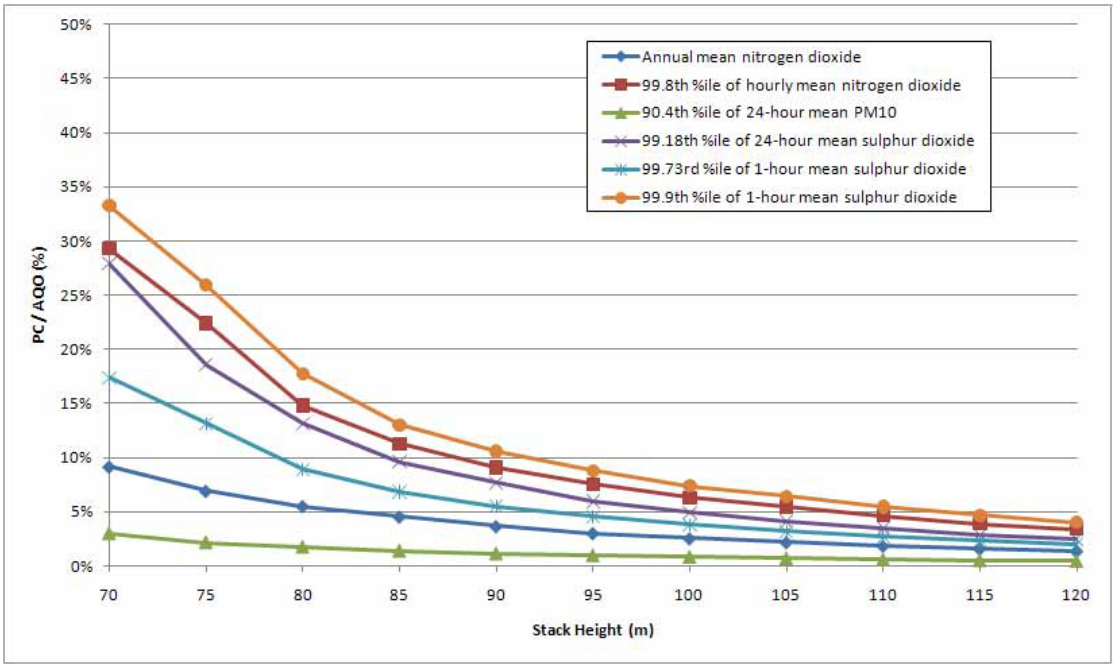
3.1. Stack Height Assessment

A stack height assessment was undertaken to determine the most appropriate stack height for the 100 MWe and 150 MWe plants to ensure that there is adequate dispersion of emissions in the atmosphere, so that air quality standards are not exceeded at sensitive receptors. This is industry standard practice for air quality assessments accepted by the Environment Agency and local authorities.

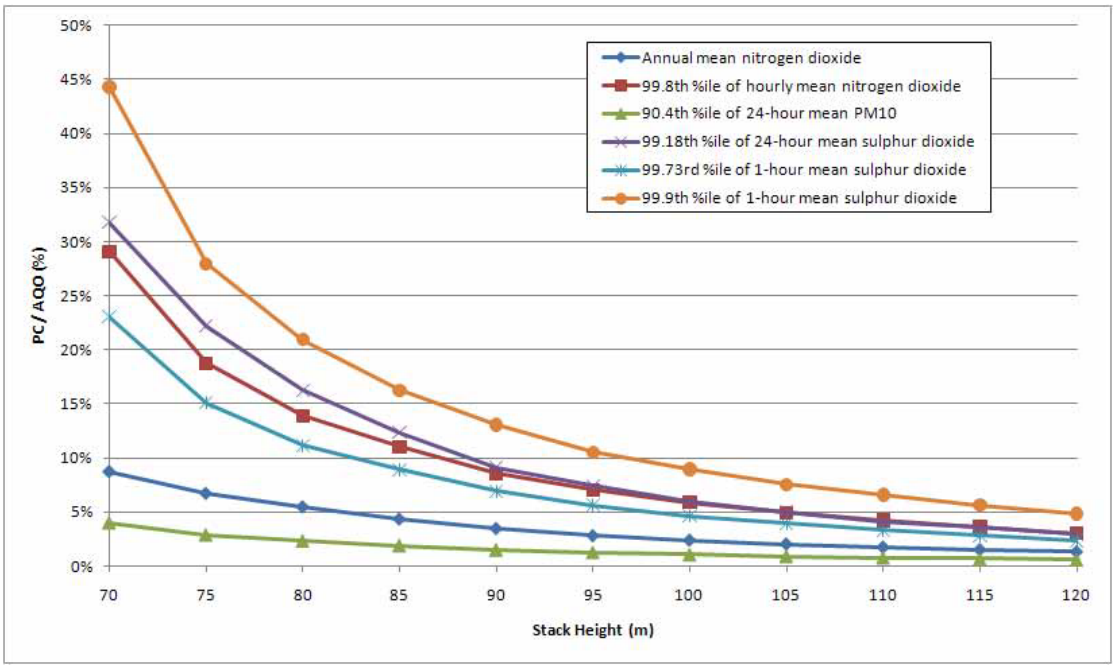
Graph 1 shows the process contributions of various substances over different averaging periods as a percentage of the relevant air quality objectives for heights between 70 m and 120 m for the 100 MWe. Similarly, Graph 2 shows the process contributions of various substances over different averaging periods as a percentage of the relevant air quality objectives for heights between 70 m and 120 m for the 150 MWe plant.

The concentrations presented are the maximum concentration at any of the modelled grid locations across the full study area. The data for these graphs are included in Appendix 2.

Graph 1 – The effect of stack height on process contributions – 100 MWe plant



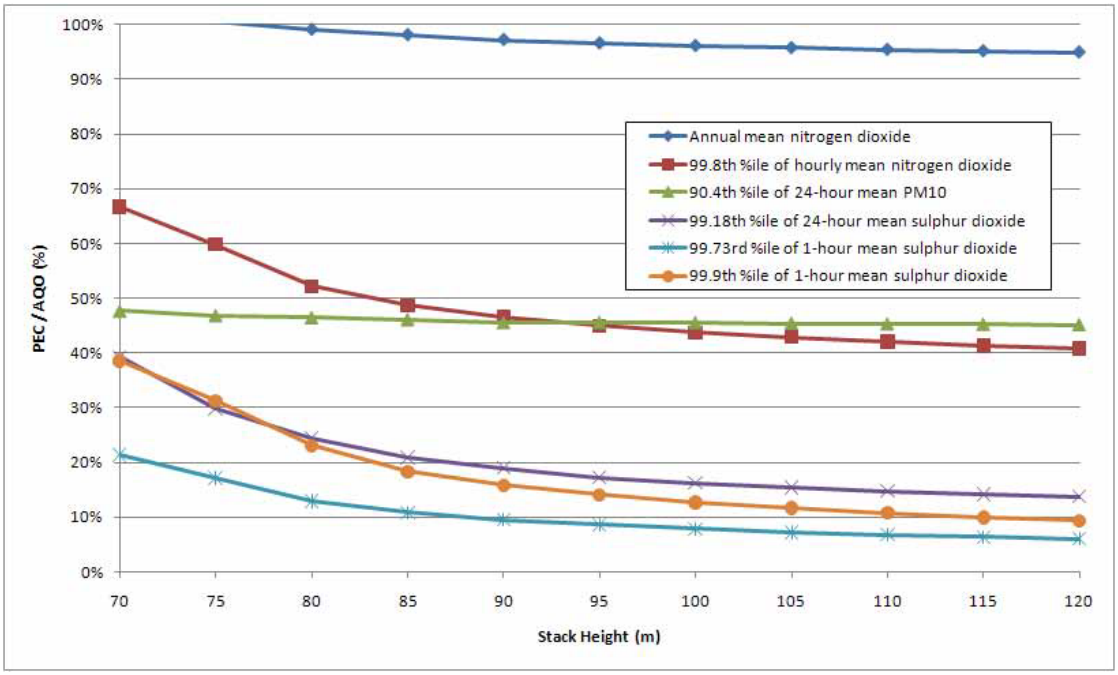
Graph 2 – The effect of stack height on process contributions – 150 MWe plant



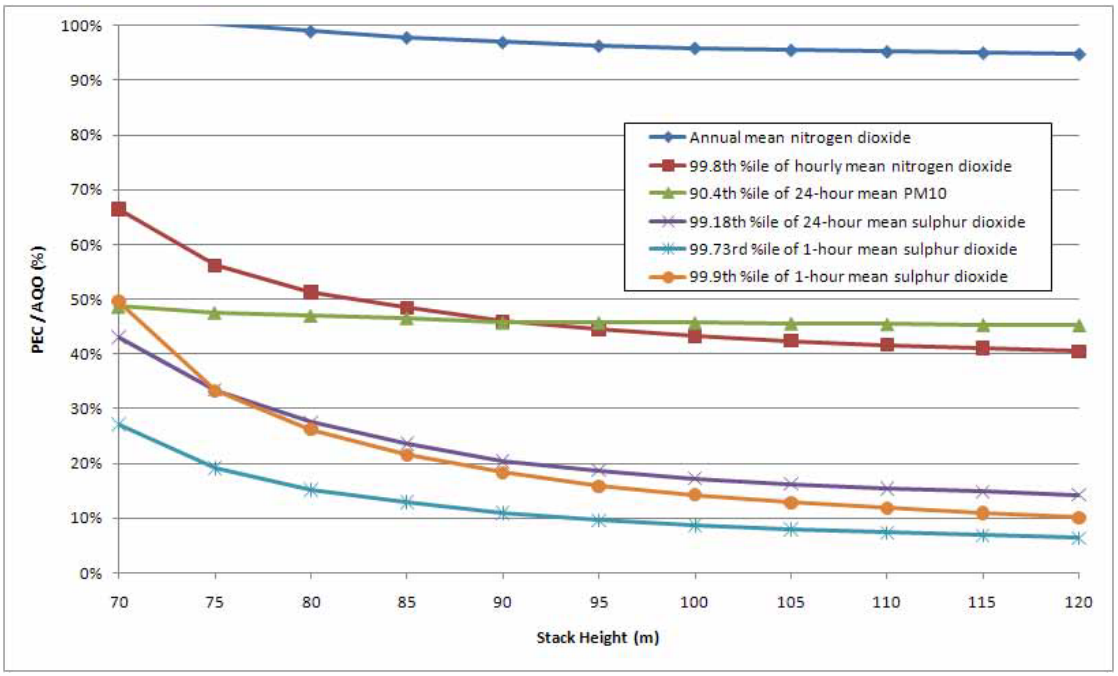
For both the 100 MWe and 150 MWe plant (Graph 1 and Graph 2), there is a noticeable decrease in the process contributions as a percentage of the air quality objectives when raising the stack height from 70m to around 85m - 90m. Raising the stack height above 90m still results in a decrease in concentrations but less significantly so than for stack heights below 90m. After around 100 m – 105 m the increase in stack height brings about an even smaller reduction in the concentrations.

Graph 3 shows the predicted environmental concentrations of various substances over different averaging periods as a percentage of the relevant air quality objectives for heights between 70 m and 120 m for the 100 MWe. Similarly, Graph 4 shows the predicted environmental concentrations of various substances over different averaging periods as a percentage of the relevant air quality objectives for heights between 70 m and 120 m for the 150 MWe plant. The source data for these graphs are included in Appendix 2.

Graph 3 – The effect of stack height on predicted environmental concentrations – 100MWe plant



Graph 4 – The effect of stack height on predicted environmental concentrations – 150MWe plant



For both the 100 MWe and 150 MWe plant, for stack heights above 80m, the predicted environmental concentrations comply with the relevant air quality objectives for all substances.

It is considered that a stack height of 105 m would represent an acceptable balance between reducing the impact on air quality and visual impacts. The stack height could be raised above 105 m if required but this would have a less significant impact on the process contributions. The results for the rest of this assessment are based on a 105 m stack height.

3.2. Main Assessment

The study results for airborne pollutants are set out in Table 5 and

Table 6 for the 100 MWe and 150 MWe plant, respectively. The tables show the maximum modelled concentrations at any off-site location for any of the three years of meteorological data for Crosby weather station datasets.

The potential impacts were assessed by comparison of the PC (Process Contribution) and PEC (Predicted Environmental Concentration) to the AQO (Air Quality Objectives). The PC is the estimated maximum environmental concentration of substances due to releases from the process alone. The PEC is the estimated maximum environmental concentration of substances due to releases from the process added to adopted baseline levels of the released substance.

Table 5 Main Dispersion Modelling Results – 100 MWe plant – 105 m Stack Height

Pollutant	Averaging period	AQO ($\mu g/m^3$)	Baseline ($\mu g/m^3$)	PC ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PC / AQO (%)	PEC / AQO (%)	Year of met dataset resulting in maximum PC
Nitrogen dioxide	Annual mean	40	37.4	0.879	38.3	2.20%	95.7%	2007
	1 hour mean (99.8th %ile)	200	74.8	11.0	85.8	5.48%	42.9%	2007
PM_{10}	Annual mean	40	22.4	0.094	22.5	0.236%	56.1%	2007
	24 hour mean (90.4th %ile) (Method 1)	50	31.5	0.094	31.6	0.189%	63.1%	2007
	24 hour mean (90.4th %ile) (Method 2)	50	22.4	0.349	22.7	0.697%	45.4%	2007
Sulphur dioxide	15 minute mean (99.9th %ile) (Method 1)	266	14.1	13.6	27.7	5.12%	10.4%	2007
	1 hour mean (99.9th %ile) (Method 2)	266	14.1	17.0	31.1	6.41%	11.7%	2007
	1 hour mean (99.73th %ile)	350	14.1	11.2	25.3	3.19%	7.22%	2007
	24 hour mean (99.18th %ile)	125	14.1	5.13	19.2	4.10%	15.4%	2007

Table 6 Main Dispersion Modelling Results – 150 MWe plant – 105 m Stack Height

Pollutant	Averaging period	AQO ($\mu g/m^3$)	Baseline ($\mu g/m^3$)	PC ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PC / AQO (%)	PEC / AQO (%)	Year of met dataset resulting in maximum PC
Nitrogen dioxide	Annual mean	40	37.4	0.817	38.2	2.04%	95.6%	2007
	1 hour mean (99.8^{th} %ile)	200	74.8	9.97	84.8	4.99%	42.4%	2005
PM_{10}	Annual mean	40	22.4	0.117	22.5	0.292%	56.2%	2007
	24 hour mean (90.4^{th} %ile) (Method 1)	50	31.5	0.117	31.6	0.233%	63.2%	2007
	24 hour mean (90.4^{th} %ile) (Method 2)	50	22.4	0.459	22.8	0.918%	45.6%	2007
Sulphur dioxide	15 minute mean (99.9^{th} %ile) (Method 1)	266	14.1	16.4	30.5	6.16%	11.46%	2005
	1 hour mean (99.9^{th} %ile) (Method 2)	266	14.1	20.4	34.5	7.65%	13.0%	2005
	1 hour mean (99.73^{th} %ile)	350	14.1	13.70	27.8	3.91%	7.94%	2007
	24 hour mean (99.18^{th} %ile)	125	14.1	6.23	20.3	4.98%	16.3%	2007

Table 7 shows the impact magnitude and a description of change of the modelled results of nitrogen dioxide and PM_{10} based on the EPUK criteria[7].

The EPUK guidance is not mandatory for this type of assessment as the main focus of the guidance is on the impact of traffic emissions and emissions from industrial sources are specifically not included in the guidance. However the guidance provides a sensible and structured methodology for determining the impact of proposed developments and has been adopted for this assessment.

The terminology used for the "impact magnitude" and "description of change" criteria are defined in the EPUK guidance.

7 Environmental Protection UK, Development Control: Planning for Air Quality (2010 Update), April 2010

Table 7 Nitrogen dioxide and PM_{10} impact magnitude and description of change – 105 m Stack Height

Plant size	Pollutant	Annual mean concentration (µg/m^3)			Impact magnitude	Description of change
		Background	PC	PEC		
100 MWe	Nitrogen dioxide	37.4	0.879	38.3	Small	Slight Adverse
	PM_{10}	22.4	0.094	22.5	Imperceptible	Negligible
150 MWe	Nitrogen dioxide	37.4	0.817	38.2	Small	Slight Adverse
	PM_{10}	22.4	0.117	22.5	Imperceptible	Negligible

As the maximum annual mean process contribution is predicted to be greater than 1% of the AQO for nitrogen dioxide, the annual mean nitrogen dioxide concentrations at the locations of the SMBC AQMAs have been modelled. This assessment was not undertaken for PM_{10} as the maximum modelled PM_{10} annual mean process contribution on the receptor grid was significantly less than 1% of the AQO and likely to be even lower in the town centre. Therefore, the impact of PM_{10} can be classed as negligible.

The results of this assessment, including the impact magnitude and a description of the change based on the EPUK criteria are shown in Table 8 and Note 1: Automatic monitoring station within the AQMA

Table 9.

Table 8 Modelling results at SMBC AQMAs – 100 MWe plant – 105 m Stack Height

AQMA reference	Annual mean nitrogen dioxide concentration (µg/m^3)			Modelled concentration as a percentage of measured concentration	Impact Magnitude	Description of change
	Measured diffusion tube 2010	PC	PEC			
AQMA 1: Crosby Road North	27	0.094	27.1	0.35%	Imperceptible	Negligible
	50	0.105	50.1	0.21%	Imperceptible	Negligible
	42	0.096	42.1	0.23%	Imperceptible	Negligible
	40[1]	0.096	40.4	0.24%	Imperceptible	Negligible
AQMA 2: Princess Way / Crosby Road South	36	0.062	36.1	0.17%	Imperceptible	Negligible
	38	0.108	38.1	0.28%	Imperceptible	Negligible
	56	0.060	56.1	0.11%	Imperceptible	Negligible
	36	0.095	36.1	0.26%	Imperceptible	Negligible
	45[1]	0.108	44.9	0.24%	Imperceptible	Negligible
AQMA 3: Miller's Bridge	46	0.210	46.2	0.46%	Imperceptible	Negligible
	37	0.224	37.2	0.61%	Imperceptible	Negligible
	37	0.222	37.2	0.60%	Imperceptible	Negligible
	60	0.206	60.2	0.34%	Imperceptible	Negligible
	51	0.201	51.2	0.39%	Imperceptible	Negligible
	41[1]	0.201	40.7	0.50%	Imperceptible	Negligible

Note 1: Automatic monitoring station within the AQMA

Table 9 Modelling results at SMBC AQMAs – 150 MWe plant – 105 m Stack Height

AQMA reference	Annual mean nitrogen dioxide concentration (µg/m^3)			Modelled concentration as a percentage of measured concentration	Impact Magnitude	Description of change
	Measured diffusion tube 2010	PC	PEC			
AQMA 1: Crosby Road North	27	0.083	27.1	0.31%	Imperceptible	Negligible
	50	0.092	50.1	0.18%	Imperceptible	Negligible
	42	0.085	42.1	0.20%	Imperceptible	Negligible
	40[1]	0.085	40.4	0.21%	Imperceptible	Negligible
AQMA 2: Princess Way / Crosby Road South	36	0.052	36.1	0.14%	Imperceptible	Negligible
	38	0.088	38.1	0.23%	Imperceptible	Negligible
	56	0.050	56.0	0.09%	Imperceptible	Negligible
	36	0.073	36.1	0.20%	Imperceptible	Negligible
	45[1]	0.088	44.9	0.20%	Imperceptible	Negligible
AQMA 3: Miller's Bridge	46	0.182	46.2	0.40%	Imperceptible	Negligible
	37	0.196	37.2	0.53%	Imperceptible	Negligible
	37	0.194	37.2	0.53%	Imperceptible	Negligible
	60	0.177	60.2	0.29%	Imperceptible	Negligible
	51	0.173	51.2	0.34%	Imperceptible	Negligible
	41[1]	0.173	40.7	0.43%	Imperceptible	Negligible

Note 1: Automatic monitoring station within the AQMA

3.3. Cumulative Assessment

The study results for airborne pollutants are set out in Table 10 and Table 11 for the 100 MWe and 150 MWe plant in combination with Project X, respectively. The tables show the maximum modelled concentrations at any off-site location for any of the three years of meteorological data for Crosby weather station datasets.

Table 10 Cumulative Assessment Results – 100 MWe plant and Project X – 105 m Stack Height

Pollutant	Averaging period	AQO ($\mu g/m^3$)	Baseline ($\mu g/m^3$)	PC ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PC / AQO (%)	PEC / AQO (%)	Year of met dataset resulting in maximum PC
Nitrogen dioxide	Annual mean	40	37.4	1.13	38.5	2.82%	96.4%	2007
	1 hour mean (99.8th %ile)	200	74.8	11.0	85.8	5.48%	42.9%	2007
PM_{10}	Annual mean	40	22.4	0.155	22.5	0.387%	56.3%	2007
	24 hour mean (90.4th %ile) (Method 1)	50	31.5	0.155	31.6	0.310%	63.3%	2007
	24 hour mean (90.4th %ile) (Method 2)	50	22.4	0.530	22.9	1.06%	45.8%	2007
Sulphur dioxide	15 minute mean (99.9th %ile) (Method 1)	266	14.1	17.9	32.0	6.73%	12.0%	2007
	1 hour mean (99.9th %ile) (Method 2)	266	14.1	22.2	36.3	8.34%	13.6%	2007
	1 hour mean (99.73th %ile)	350	14.1	14.0	28.1	4.00%	8.03%	2007
	24 hour mean (99.18th %ile)	125	14.1	6.49	20.6	5.19%	16.5%	2007

Table 11 Cumulative Assessment Results – 150 MWe plant and Project X – 105 m Stack Height

Pollutant	Averaging period	AQO ($\mu g/m^3$)	Baseline ($\mu g/m^3$)	PC ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PC / AQO (%)	PEC / AQO (%)	Year of met dataset resulting in maximum PC
Nitrogen dioxide	Annual mean	40	37.4	1.12	38.5	2.80%	96.3%	2007
	1 hour mean (99.8th %ile)	200	74.8	10.0	84.8	4.99%	42.4%	2007
PM_{10}	Annual mean	40	22.4	0.160	22.5	0.400%	56.3%	22.4
	24 hour mean (90.4th %ile) (Method 1)	50	31.5	0.160	31.6	0.320%	63.3%	31.5
	24 hour mean (90.4th %ile) (Method 2)	50	22.4	0.530	22.9	1.06%	45.8%	22.4
Sulphur dioxide	15 minute mean (99.9th %ile) (Method 1)	266	14.1	18.5	32.6	6.94%	12.2%	2007
	1 hour mean (99.9th %ile) (Method 2)	266	14.1	22.7	36.8	8.55%	13.8%	2007
	1 hour mean (99.73th %ile)	350	14.1	14.0	28.1	4.00%	8.03%	2007
	24 hour mean (99.18th %ile)	125	14.1	6.49	20.6	5.19%	16.5%	2007

Table 12 shows the impact magnitude and a description of change of the modelled results of nitrogen dioxide and PM_{10} based on the EPUK criteria[7].

Table 12 Nitrogen dioxide and PM_{10} impact magnitude and description of change – 105 m Stack Height

Plant size	Pollutant	Annual mean concentration (µg/m^3)			Impact magnitude	Description of change
		Background	PC	PEC		
100 MWe + Project X	Nitrogen dioxide	37.4	1.13	38.5	Small	Slight Adverse
	PM_{10}	22.4	0.15	22.5	Imperceptible	Negligible
150 MWe + Project X	Nitrogen dioxide	37.4	1.12	38.5	Small	Slight Adverse
	PM_{10}	22.4	0.16	22.5	Imperceptible	Negligible

As the maximum annual mean process contribution is predicted to be greater than 1% of the AQO for nitrogen dioxide, the annual mean nitrogen dioxide concentrations at the locations of the SMBC air quality management areas have been modelled. This assessment was not undertaken for PM_{10} as the maximum modelled PM_{10} annual mean process contribution on the receptor grid was significantly less than 1% of the AQO and likely to be even lower in the town centre. Therefore the impact of PM_{10} can be classed as negligible.

The results of this assessment, including the impact magnitude and a description of the change are shown in Table 13 and Note 1: Automatic monitoring station within the AQMA

Table 14.

Table 13 Modelling results at SMBC AQMAs – 100 MWe plant and Project X – 105 m Stack Height

AQMA reference	Annual mean nitrogen dioxide concentration (µg/m^3)			Modelled concentration as a percentage of measured concentration	Impact Magnitude	Description of change
	Measured diffusion tube 2010	PC	PEC			
AQMA 1: Crosby Road North	27	0.164	27.2	0.61%	Imperceptible	Negligible
	50	0.181	50.2	0.36%	Imperceptible	Negligible
	42	0.168	42.2	0.40%	Imperceptible	Negligible
	40[1]	0.168	40.5	0.42%	Imperceptible	Negligible
AQMA 2: Princess Way / Crosby Road South	36	0.144	36.1	0.40%	Imperceptible	Negligible
	38	0.192	38.2	0.51%	Imperceptible	Negligible
	56	0.142	56.1	0.25%	Imperceptible	Negligible
	36	0.183	36.2	0.51%	Imperceptible	Negligible
	45[1]	0.192	45.0	0.43%	Imperceptible	Negligible
AQMA 3: Miller's Bridge	46	0.393	46.4	0.85%	Imperceptible	Negligible
	37	0.414	37.4	1.1%	Small	Slight Adverse
	37	0.414	37.4	1.1%	Small	Slight Adverse
	60	0.383	60.4	0.64%	Imperceptible	Negligible
	51	0.378	51.4	0.74%	Imperceptible	Negligible
	41[1]	0.378	40.9	0.93%	Imperceptible	Negligible

Note 1: Automatic monitoring station within the AQMA

Table 14 Modelling results at SMBC AQMAs – 150 MWe plant and Project X – 105 m Stack Height

AQMA reference	Annual mean nitrogen dioxide concentration (µg/m^3)			Modelled concentration as a percentage of measured concentration	Impact Magnitude	Description of change
	Measured diffusion tube 2010	PC	PEC			
AQMA 1: Crosby Road North	27	0.153	27.2	0.57%	Imperceptible	Negligible
	50	0.167	50.2	0.33%	Imperceptible	Negligible
	42	0.156	42.2	0.37%	Imperceptible	Negligible
	40[1]	0.156	40.5	0.39%	Imperceptible	Negligible
AQMA 2: Princess Way / Crosby Road South	36	0.133	36.1	0.37%	Imperceptible	Negligible
	38	0.171	38.2	0.45%	Imperceptible	Negligible
	56	0.131	56.1	0.23%	Imperceptible	Negligible
	36	0.161	36.2	0.45%	Imperceptible	Negligible
	45[1]	0.171	45.0	0.38%	Imperceptible	Negligible
AQMA 3: Miller's Bridge	46	0.365	46.4	0.79%	Imperceptible	Negligible
	37	0.390	37.4	1.1%	Imperceptible	Negligible
	37	0.386	37.4	1.0%	Imperceptible	Negligible
	60	0.355	60.4	0.59%	Imperceptible	Negligible
	51	0.350	51.3	0.69%	Imperceptible	Negligible
	41[1]	0.350	40.9	0.86%	Imperceptible	Negligible

Note 1: Automatic monitoring station within the AQMA

4. Discussion

4.1. Stack Height Assessment

The determination of a suitable stack height is not straightforward for the proposed biomass plants because, at the point on the graphs where the gradient of the curve starts to flatten out, 85-90m, the concentrations remain relatively high. Therefore, a stack height of 105m has been chosen for both of the plants. A stack height of 105m would represent an acceptable balance between reducing the impact on air quality and visual impacts for both the 100 MWe and 150 MWe plant.

4.2. Main Assessment

The results show that all of the modelled concentrations comply with the relevant AQOs at all locations for the 100 MWe and 150 MWe plant.

The predicted environmental concentration for the annual mean nitrogen dioxide concentration is 95.7% and 95.6% of the AQO for the 100 MWe and 150 MWe plant, respectively. This is mainly due to the high background concentration for the assessment area which is approximately 94% of the AQO.

The assessment of impact magnitude and description of change for the annual mean nitrogen dioxide concentrations based on the maximum concentration at any off-site location is small and can be classed as slight adverse for the 100 MWe and 150 MWe plant. For PM_{10} the impact is imperceptible and so this can be classed as negligible for both sized plants. Therefore, the stack height of 105m is considered to be acceptable.

The impact of emissions to air on the annual mean nitrogen dioxide concentrations at the SMBC AQMAs is considered to be imperceptible at all locations for both the 100 MWe and 150 MWe plant. Therefore the impact of the proposed biomass plant on the AQMAs can be described as negligible and the stack height of 105m is considered to be acceptable.

AQMAs are declared at locations where the local authority has measured exceedances of the air quality objectives. The measured 2010 diffusion tubes concentrations do not exceed 40 $\mu g/m^3$ at any location outside of the AQMA. Given the results of the modelling, in particular the annual mean nitrogen dioxide concentrations, it is unlikely that the contribution from the proposed plant will lead to an exceedance of the air quality objectives.

4.3. Cumulative Assessment

The results show that all of the modelled concentrations comply with the relevant AQOs at all locations for the 100 MWe and 150 MWe plant. There is little difference between then predicted concentrations for the cumulative assessment when the proposed RES plant changes from

100 MWe to 150 MWe, this is because the maximum concentrations arise mainly due to emissions from Project X rather than the Proposed RES plant. The exceptiom to this is for the 99.8th percentile of nitrogen dioxide concentrations which arises due to emissions from the proposed RES plant rather than Project X.

The predicted environmental concentration for the annual mean nitrogen dioxide concentration is 96.4% and 96.3% of the AQO for the 100 MWe and 150 MWe plants, respectively. These high concentrations are due to the high background concentration for the assessment area which is approximately 94% of the AQO.

The greatest difference in the PC / AQO at the maximum location on the receptor grid following the addition of Project X occurs for the 99.9th percentile of hourly mean sulphur dioxide concentrations and is 1.9% and 0.9% for the 100 MWe and 150 MWe plant, respectively. The difference between the results for the proposed plant alone and the cumulative assessment is relatively small. This is because the plants are over 2 km apart and so the location where the maximum contributions occur for the individual plants do not overlap with each other.

As with the assessment of the proposed plant in isolation, the assessment of impact magnitude and description of change for the annual mean nitrogen dioxide concentrations based on the maximum concentration at any off-site location is small and therefore can be classed as slight adverse for the 100 MWe and 150 MWe plant. For PM_{10} the impact is imperceptible and so this can be classed as negligible for both sized plants.

For the 100 MWe plant, the description of change at AQMA 1 and AQMA 2 is negligible. At AQMA 3 (Miller's Bridge) the description of change is classed as slight adverse. The maximum difference in the annual mean nitrogen dioxide concentration at the SMBC AQMAs for the 100 MWe plant with inclusion of Project X is 0.19 $\mu g/m^3$ at Miller's Bridge.

The impact of emissions to air on the annual mean nitrogen dioxide concentrations at the SMBC AQMAs is considered to be imperceptible at all locations for the 150 MWe plant. Therefore the impact of the proposed biomass plant on the AQMAs can be described as negligible. The maximum difference in the annual mean nitrogen dioxide concentration at the SMBC AQMAs for the 150 MWe plant with inclusion of Project X is 0.19 $\mu g/m^3$ at Miller's Bridge.

5. Conclusions

The conclusions of the preliminary assessment are as follows:

- A stack height of at least 105 m for the 100 MWe and 150 MWe plant will be required;
- The predicted environmental concentrations comply with the relevant air quality objectives at the location of the maximum process contribution on the receptor grid for the proposed site alone and in combination with Project X;

Proposed Plant

- For the maximum concentration for the 100 MWe and 150 MWe plant at any off-site location the description of change for the annual mean nitrogen dioxide concentrations is classed as slight adverse and for PM_{10} the maximum impact is negligible;
- The impact of emissions to air of nitrogen dioxide from the proposed plant at the SMBC AQMAs are negligible;

Cumulative Assessment

- For the maximum concentration for the 100 MWe and 150 MWe plant at any off-site location the description of change for the annual mean nitrogen dioxide concentrations is classed as slight adverse and for PM_{10} the maximum impact is negligible;
- The impact of emissions to air of nitrogen dioxide from the proposed plant in combination with Project X at the SMBC AQMAs is negligible at AQMA 1 and AQMA 2 for the proposed biomass plant. At AQMA 3 (Miller's Bridge) the description of change is classed as slight adverse.

Overall

Overall, the impact of emissions to air from the proposed biomass plant are likely to be acceptable for both the 100 MWe and 150 MWe plant when operating in isolation and in combination with Project X.

However, this will be confirmed on completion of the full air quality impact assessment as part of the Environmental Statement.

We also recommend that this preliminary assessment is shared with the Environmental Health Officer at SMBC as part of the consultation process, as this may guide how we proceed with the air quality assessment for the Environmental Statement.

Appendices

Appendix 1 Dispersion Model Inputs

Building Details

Buildings or structures can have a significant influence on local airflows so that, under certain circumstances, an emission plume may be drawn down towards ground level. This is referred to as "building downwash," and can result in released substances reaching ground level at higher concentrations than would otherwise be the case. The model parameters used to describe the Project buildings are set out in Table A1. The effects of building downwash from other site buildings and off-site buildings are expected to be negligible due to the relatively low building heights and the distance from the emissions source.

Table A1 Building Details

Building	Grid Coordinate of Centre		Height (m)	Length (m)	Width (m)	Angle of length to North (˚)
	Easting	Northing				
100 MWe						
Boiler Hall*	332983	395413	65	60	35	71
Turbine Hall	332952	395456	30	50	30	71
Bag Filter in-building	332935	395397	30	30	20	71
Workshop	332982	395437	40	75	10	71
150 MWe						
Boiler Hall*	332983	395413	65	60	38	69
Turbine Hall	332952	395460	30	55	35	69
Bag Filter in-building	332936	395395	35	35	25	69
Workshop	332981	395438	40	75	10	69
Project X						
Boiler Hall*	333595	393265	65	60	38	69
Turbine Hall	333567	393314	30	55	35	69
Bag Filter in-building	333547	393248	35	35	25	69
Workshop	333593	393290	40	75	10	69

*Note * indicates main building*

Surrounding Land Use

The variable turbulence caused by 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 stack and subsequently the modelled ground level concentrations.

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 main boiler stack, incorporates both the town of Bootle and areas of lower surface roughness values for the Irish Sea / Mersey Estuary.

On this basis, a variable surface roughness file was set up to represent the changing surface roughness across the study area. The study area encompassing the Irish Sea / Mersey Estuary was specified a surface roughness of 0.001 m and the area on-land, encompassing the town of Blyth, was specified with a value of 0.8 m.

Meteorological Data

Meteorological data for the dispersion modelling study were obtained from the Met Office. The most appropriate meteorological station to represent weather conditions at the site is the Crosby weather station. This station is located approximately 7 km to the north of the site, and is situated close to the coastline similar to the proposed development site. The roughness length at the weather station is 0.35m.

Three years of hourly sequential data recorded in 2005, 2006 and 2007 at the Crosby weather station have been used in this study. All data have been accepted de facto and it has been assumed that the data are representative of conditions at the site. Predicted pollutant concentrations presented are for the maximum obtained using any of these three years.

Sensitive Receptors

The following potentially sensitive locations and habitats are located in the vicinity of the proposed Project and forecast levels of airborne pollutants were specifically assessed at these locations.

Locations Where People May be Present

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.

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 Project is considered. The modelled grid was specified as a 5 km x 5 km 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 this air quality chapter indicate that the grid size is sufficient to determine the dispersion of substances from the main boiler stack.

The maximum predicted concentration at any off-site location was used in the assessment to determine the potential impact at locations where people may be present.

Details of the modelling grid domain are given in Table A2.

Table A2 Receptor grid

Direction	Start	Finish	Number of points	Grid spacing
East – West	330700	335700	101	50m
North - South	392900	397900	101	50m

An assessment was also carried out to predict the annual mean nitrogen dioxide concentrations at the SMBC passive diffusion tube locations situated within the town AQMAs. These locations are given in Table A3.

Table A3 SMBC Air Quality Management Areas

AQMA	Diffusion Tube Reference	Site location	Location (OS grid reference)	
			Easting (m)	Northing (m)
AQMA 1: Crosby Road North	Tube NAM	Sycamore Road, Crosby	332152	398648
	Tube NCJ	South Road, Waterloo	332204	398230
	Tube UK4	Crosby Road North, Waterloo	332170	398538
AQMA 2: Princess Way / Crosby Road South	Tube NW	Gladstone Road/Gordon Road, Seaforth	332978	397021
	Tube NBW	Crosby Road South/Riversdale Road, Seaforth	332599	397021
	Tube NBY	Lytton Grove, Seaforth	333017	396995
	Tube NC86	Crosby Road South, Seaforth	332685	396768
AQMA 3: Miller's Bridge	Tube NBM	Millers Bridge, Bootle	333785	394594
	Tube NBO	Douglas Place, Bootle	333828	394457
	Tube NBQ	Douglas Place/Millers Bridge, Bootle	333834	394570
	Tube NBR	Derby Road, Bootle	333751	394553
	Tube NBS	Derby Road, Bootle	333757	394622

Calculation of Predicted Environmental Concentrations

In the case of long-term mean concentrations, it was relatively straightforward to combine modelled process contributions with baseline air quality levels, as long-term mean concentrations due to Project emissions, could be added directly to long-term mean baseline concentrations.

It is not possible to add short-period peak baseline and process contributions directly. 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 (such as the Project) are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources (e.g. traffic).

As described in Environment Agency H1 guidance[8], for most substances the short-term peak PC values are added to twice the long-term mean baseline concentration to provide a reasonable estimate of peak concentrations due to emissions from all sources. The exception is when assessing PM_{10} levels against the objective for 24 hour means. In this case the short term background was derived using the maximum concentration from the following two approaches as set out in TG(09)[9]:

8 Environment Agency, H1 Environmental Risk Assessment, Annex (f) Air Emissions, April 2010
9 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

Method 1: 90.4th percentile 24-hour mean background PM_{10} (24.2 µg/m^3) plus the modelled annual mean process contribution PM_{10}; or

Method 2: Modelled 90.4th percentile 24-hour mean process contribution plus the annual mean background contribution (17.2 µg/m^3).

The 15-minute mean sulphur dioxide process contributions were derived using the maximum concentration from the following two approaches as set out in TG(09)[9]:

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.

Modelling Uncertainty and Conservative Assumptions

Uncertainty

There are always uncertainties in a dispersion modelling study in common with any environmental modelling exercise, because a dispersion model is an approximation of 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 go 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 Facility Site. However, the most suitable available meteorological data were chosen for the assessment;
- the modelling of atmospheric dispersion processes is more reliable for long period means than short period means. ADMS is usually more reliable over intermediate distances (100 m to 1000 m) than for points 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; and
- modelling does not specifically take into account individual small-scale features such as vegetation, local terrain variations and off-site buildings. The roughness length 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 boiler plant will operate continuously at maximum load for the entire year. In practice, the plant will have periods of shut-down and maintenance and may not always operate at maximum load.
- 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 the vicinity of the Project was used in the assessment of environmental effects. Concentrations at other locations will be less than the maximum values presented;
- the highest predicted concentrations obtained using any of the three different years of meteorological data for either of the weather stations 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 Project will be converted to nitrogen dioxide at ground level in the vicinity of the Project 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;
- for the assessment of PM_{10} levels, it was assumed that 100% of the particulate matter emitted from the plant will be in the PM_{10} size fraction. The actual proportion will be less than 100%.

Appendix 2 Stack Height Assessment Modelling Results

Table A4 shows the process contribution of various substances over different averaging periods for heights between 70 m and 120 m for the 100 MWe plant.

Table A4 Stack Height Dispersion Modelling Process Contribution Results – 100 MWe plant

Stack Height (m)	PC (µg/m^3)						PC / AQO (%)					
	Nitrogen dioxide		PM_{10}	Sulphur dioxide			Nitrogen dioxide		PM_{10}	Sulphur dioxide		
	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean
70	3.7	59	1.5	35	61	88	9.2%	29%	3.0%	28%	17%	33%
75	2.8	45	1.1	23	46	69	6.9%	22%	2.1%	19%	13%	26%
80	2.2	30	0.87	16	31	47	5.5%	15%	1.7%	13%	8.9%	18%
85	1.8	23	0.69	12	24	35	4.5%	11%	1.4%	9.6%	6.9%	13%
90	1.5	18	0.57	9.6	19	28	3.7%	9.1%	1.1%	7.7%	5.5%	11%
95	1.2	15	0.48	7.5	16	23	3.0%	7.6%	0.97%	6.0%	4.5%	8.8%
100	1.0	13	0.41	6.2	13	20	2.6%	6.3%	0.83%	4.9%	3.8%	7.4%
105	0.88	11	0.35	5.1	11	17	2.2%	5.5%	0.70%	4.1%	3.2%	6.4%
110	0.75	9.3	0.29	4.3	9.6	15	1.9%	4.6%	0.59%	3.5%	2.7%	5.5%
115	0.64	7.8	0.25	3.6	8.1	12	1.6%	3.9%	0.51%	2.9%	2.3%	4.7%
120	0.55	6.8	0.22	3.1	6.9	11	1.4%	3.4%	0.44%	2.5%	2.0%	4.0%

Table A5 shows the process contribution of various substances over different averaging periods for heights between 70 m and 120 m for the 150 MWe plant.

Table A5 Stack Height Dispersion Modelling Process Contribution Results – 150 MWe plant

Stack Height (m)	PC (µg/m^3)						PC / AQO (%)					
	Nitrogen dioxide		PM_{10}	Nitrogen dioxide			Nitrogen dioxide		PM_{10}	Nitrogen dioxide		
	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean
70	3.5	58	2.0	40	81	118	8.8%	29.1%	4.0%	32%	23%	44%
75	2.7	37	1.5	28	53	74	6.7%	18.7%	2.9%	22%	15%	28%
80	2.2	28	1.2	20	39	56	5.5%	13.9%	2.3%	16%	11%	21%
85	1.7	22	0.95	15	31	43	4.4%	11.0%	1.9%	12%	8.9%	16%
90	1.4	17	0.75	11	24	35	3.5%	8.5%	1.5%	9.1%	6.9%	13%
95	1.1	14	0.63	9.3	20	28	2.8%	7.1%	1.3%	7.4%	5.6%	11%
100	0.96	12	0.53	7.4	16	24	2.4%	5.9%	1.1%	5.9%	4.6%	9.0%
105	0.82	9.9	0.46	6.2	14	20	2.0%	4.9%	0.92%	5.0%	3.9%	7.6%
110	0.70	8.5	0.39	5.2	12	17	1.8%	4.2%	0.78%	4.1%	3.3%	6.6%
115	0.61	7.2	0.34	4.5	9.8	15	1.5%	3.6%	0.68%	3.6%	2.8%	5.6%
120	0.52	6.1	0.29	3.7	8.3	13	1.3%	3.0%	0.58%	3.0%	2.4%	4.8%

Table A6 shows the predicted environmental concentrations of various substances over different averaging periods for heights between 70 m and 120 m for the 100 MWe.

Table A6 Stack Height Predicted Environmental Concentrations – 100 MWe plant

Stack Height (m)	PEC (µg/m^3)						PEC / AQO (%)					
	Nitrogen dioxide		PM_{10}	Sulphur dioxide			Nitrogen dioxide		PM_{10}	Sulphur dioxide		
	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean
70	41.1	133.4	23.8	49.0	74.9	102.6	102.7%	66.7%	47.7%	39.2%	21.4%	38.6%
75	40.2	119.6	23.4	37.3	60.1	83.1	100.5%	59.8%	46.9%	29.9%	17.2%	31.2%
80	39.6	104.4	23.2	30.5	45.3	61.4	99.1%	52.2%	46.5%	24.4%	12.9%	23.1%
85	39.2	97.4	23.1	26.1	38.1	48.7	98.1%	48.7%	46.1%	20.9%	10.9%	18.3%
90	38.9	93.0	22.8	23.7	33.4	42.2	97.2%	46.5%	45.5%	19.0%	9.5%	15.9%
95	38.6	90.0	22.8	21.6	30.0	37.5	96.6%	45.0%	45.5%	17.3%	8.6%	14.1%
100	38.4	87.4	22.8	20.3	27.4	33.7	96.1%	43.7%	45.5%	16.2%	7.8%	12.7%
105	38.3	85.8	22.7	19.2	25.3	31.1	95.7%	42.9%	45.4%	15.4%	7.2%	11.7%
110	38.2	84.1	22.7	18.4	23.7	28.6	95.4%	42.0%	45.3%	14.8%	6.8%	10.8%
115	38.1	82.6	22.6	17.7	22.2	26.5	95.1%	41.3%	45.2%	14.1%	6.4%	10.0%
120	38.0	81.6	22.6	17.2	21.0	24.8	94.9%	40.8%	45.2%	13.7%	6.0%	9.3%

A7 shows the predicted environmental concentrations of various substances over different averaging periods for heights between 70 m and 120 m for the 150 MWe plant.

Table A7 Stack Height Predicted Environmental Concentrations – 150 MWe plant

Stack Height (m)	PEC (µg/m^3)						PEC / AQO (%)					
	Nitrogen dioxide		PM_{10}	Nitrogen dioxide			Nitrogen dioxide		PM_{10}	Nitrogen dioxide		
	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean	Annual mean	99.8th percentile of hourly mean	90.4th percentile of 24-hour mean	99.18th percentile of 24-hour mean	99.73rd percentile of 1-hour mean	99.9th percentile of 1-hour mean
70	40.9	133.0	24.4	53.8	94.8	132.0	102.3%	66.5%	48.7%	43.1%	27.1%	49.6%
75	40.1	112.3	23.8	41.8	66.9	88.4	100.3%	56.2%	47.6%	33.5%	19.1%	33.2%
80	39.6	102.6	23.5	34.4	53.1	69.8	99.0%	51.3%	47.1%	27.5%	15.2%	26.2%
85	39.2	96.9	23.3	29.5	45.2	57.3	97.9%	48.5%	46.6%	23.6%	12.9%	21.5%
90	38.8	91.9	22.9	25.5	38.3	48.8	97.0%	46.0%	45.8%	20.4%	11.0%	18.4%
95	38.5	89.0	22.9	23.4	33.8	42.1	96.3%	44.5%	45.8%	18.7%	9.6%	15.8%
100	38.4	86.6	22.9	21.5	30.3	37.9	95.9%	43.3%	45.8%	17.2%	8.7%	14.3%
105	38.2	84.7	22.8	20.3	27.8	34.2	95.6%	42.4%	45.6%	16.3%	7.9%	12.9%
110	38.1	83.3	22.7	19.3	25.6	31.6	95.3%	41.6%	45.5%	15.4%	7.3%	11.9%
115	38.0	82.1	22.7	18.6	23.9	29.1	95.1%	41.0%	45.4%	14.8%	6.8%	10.9%
120	37.9	80.9	22.6	17.8	22.4	26.9	94.8%	40.4%	45.3%	14.3%	6.4%	10.1%

Alexandra Dock Renewable Energy Project
Environmental Scoping Report

Appendix B Traffic and Transport Scoping Statement and Informal Consultation Record

power for good

Proposed Biomass Plant at Alexandra Dock, Sefton

Development Details and Transport Assessment Scoping Statement

1.0 Proposed Development

- 100 to 150MW Renewable Energy (Biomass) Plant, but scoping figures presented below are based on worst case 150MW scenario.
- Development site is located at Alexandra Dock within the existing Port operational area.
- Vehicular access will be via a variety of routes including the M57, M58 and M62 Motorways, the A5036(T), the A5058, the A565 and then via either the Main Port Gate at Seaforth or the Strand Port Gate.
- Total workforce of 45 staff, comprising:
  - 16 staff on permanent daywork on site between 0800 to 1700 hours, Monday to Friday.
  - 29 shift based operational, maintenance and fuels staff split over a seven day shift pattern
  - A total of 24 staff on site between 0800 to 1700 hours, Monday to Friday.
- Fuel delivery: up to 1,200,000 tonnes of biomass per annum (tpa), 20% of which is assumed to arrive by road in 26.5 tonne loads with the remainder arriving by sea. Although biomass delivery vehicles will be able to access the site 24/7 via the Main Port Gate, (access via the Strand Port Gate is restricted to between 0615 and 1915 hours Monday to Friday), the assumption is made that deliveries will be undertaken between 0700 and 2100 hours, 7 days a week. Ship unloading and delivery will be 24/7.
- Ash export, as a by-product of combustion and Reagents import, 25,000tpa in total. Ash will be exported by road and, if feasible, by barge/ship. All Reagents will be imported by road. To ensure a robust, worst case assessment of potential future traffic movements, the assumption is made that all Ash removal and Reagent deliveries will be undertaken by road in 20 tonne loads within normal working hours Monday to Friday.
- Other deliveries include 26 deliveries of fuel oil annually.

2.0 Construction Programme, Staffing and Construction Traffic

- 36 month construction programme, completion in 2016.
- Daily construction workforce will average at 300 staff but will peak at 500 staff in month 20 - 26, namely 2015.
- Parking for construction staff vehicles will be provided within the Port operational area.
- Assumed construction day shift of 0700 to 1800 hours Monday to Saturday (comprising a 10 hour shift + 1 hour break).

- Typical daily civil and mechanical works traffic (HGV and LGV) will comprise 43 HGVs and 23 LGVs, spread evenly over the daily shift period.
- All civil and mechanical works traffic will be routed along the trunk roads and primary routes. This is equivalent to 6 vehicles per hour per direction for the shift period.
- The majority of the Abnormal Indivisible Loads (AIL) are expected to arrive by sea. However, to ensure a robust, worst case, assessment some road-borne AIL movements are assumed. The routing of these movements will be agreed with the Local Highway Authorities and the Highways Agency.

3.0 Traffic Generation Assumptions for Operational Traffic

- Assume 100% staff will travel by private car for robustness. In reality, some local staff may make use of existing bus services and cycle to site.
- The AM and PM peak periods on the local road network will coincide with day shift arrivals, 24 vehicles arriving/4 vehicles departing during 0800 to 0900 hours and day shift departures, 24 vehicles departing during 1700 to 1800 hours.
- Biomass fuel delivery: up to 20% of 1,200,000tpa by road in 26.5 tonne loads, between 0700 and 2100 hours, seven days a week = 34 vehicles per day per direction. This equates to between 2 and 3 HGVs per hour per direction on the road network. If 100% fuel were assumed to arrive by road, which is highly unlikely, this would equate to between 10 and 11 HGVs per hour per direction.
- All fuel delivery traffic will be routed along the Motorways, trunk roads and the primary HGV routes to the Port including M57, M58 and M62 Motorways, A5036(T), A5058 and the A565.
- Ash export and Reagent import: 25,000 tpa by road in 20 tonne loads = approximately 4 HGVs per day per direction Monday to Friday arriving and departing the plant.
- Other deliveries include 26 deliveries of fuel oil annually = 2 – 3 HGVs per month.
- Based on the above data, it is evident that operational traffic volumes are very low and unlikely to be detectable within the day to day variation in traffic flow on the local and trunk roads network.

4.0 Traffic Generation and Trip Distribution Assumptions for Construction Traffic

- The peak construction workforce will be 500 staff and this will occur in 2015.
- The workforce will comprise a mixture of general labour and specialist labour with the proportion of specialist labour increasing towards the end of the construction programme and during commissioning.
- It has been assumed that the construction day shift will operate 0700 to 1800 hours, (10 hour shift + 1 hour break). Therefore, the peak periods for construction worker traffic will occur during 0600 to 0700 hours for arrivals and 1800 to 1900 hours for departures.
- At this stage, the precise origins of the likely construction workforce are unknown. However, given the location of the site, it is likely that attempts will be made to recruit

general staff from experienced contractors in the local area with specialist staff staying in local accommodation for the duration of the contract.

- To provide an initial trip distribution pattern for consideration by the respective Local Highway Authorities and the Highways Agency, use has been made of Travel to Work Data obtained from the 2001 census for the average of the two wards in Sefton that cover the areas of the Port that are closest to the site, namely, Linacre in which the site is located and Church, which lies immediately to the north. Also, the A3036(T), which provides a direct link between the strategic highway network at Switch Island and the main Port Gate at Seaforth forms the boundary between the two wards.
- In deriving the trip distribution pattern, the assumption has been made that the construction staff are likely to originate from the centres of population within the North West. Also, it is assumed that staff travelling to/from the Wirral and those wards within Liverpool located immediate to the south of the site will utilise the Strand Gate rather than the main Port Gate at Seaforth. The suggested trip distribution pattern is shown in **Figure 1**.
- For robustness, the assumption will be made that 80% of staff will travel to the site by private car with an average occupancy of 2 staff per vehicle and 20% will travel to site in mini-buses with an average occupancy of 7 staff per vehicle. This is to account for the fact that some of the general and specialist staff will work in gangs. The resulting construction staff traffic volumes are 215 arrivals during the period 0600 to 0700 hours and 215 departures during the period 1800 to 1900 hours, distributed on the network and at the two points of entry to the Port as shown in **Figure 2**.
- As a proportion of construction staff originating in the area local to the site may, in reality, utilise local bus services or cycle to the site, the methodology outlined above results in a robust assessment of traffic generation.
- All civil and mechanical works traffic will access the site via the trunk roads and the primary routes.

5.0 Suggested Scope of Assessment

- The operational traffic impact of the development proposal is insignificant. As the greater traffic impact will occur during the temporary construction period a full Transport Assessment of the proposals in accordance with current guidance is not appropriate. Instead, an operational assessment of those junctions on the network of interest that are likely to experience a material increase in traffic flow during the peak construction year (2015) is proposed.
- The network of interest will comprise the following junctions:
- The site access / A565 junctions;
- Strand Road / A565 junction; and
- Millers Bridge junction.
- The network of interest will also include the following links:
- A565(north of Seaforth Gate);
- A565(south of Strand Gate);

- A5058; and
- A5036.

- The year of assessment will be 2015 and the periods of assessment will reflect the peaks for construction worker traffic, namely, 0600 to 0700 hours and 1800 to 1900 hours.
- Background traffic flows for junctions and links on the network of interest will be obtained from a variety of sources including Sefton Council's Breathing Space website, the Highways Agency TRADS database, publicly available information and new traffic counts, where required.
- Background traffic flows will be expanded to 2015 levels using NRTF central growth factors
- The traffic generation and trip distribution assumptions will be as outlined above.
- The assessment will take account of the traffic effects of the following committed developments:

  (i) EMR Waste to Energy Plant;
  (ii) LIFT Zone Phase 2 Warehousing;
  (iii) Seaforth River Terminal;
  (iv) Residential Development at Queens Bedford [flows to be provided by Sefton Council]; and
  (v) Residential Development at Stanley Dock.
- The assessment will include a review of the most recent five years personal injury accident record for the network of interest.
- The assessment will include a review of accessibility to the site by modes of transport other than the private car.
- The assessment will not include a review of prevailing local transport planning policy.

6.0 Construction Transport Management Plan/Travel Plan

- A requirement for a Construction Traffic Management Plan will be a suggested condition of any subsequent planning consent.
- A Travel Plan will not be required for the plant due to the small number of operational staff.

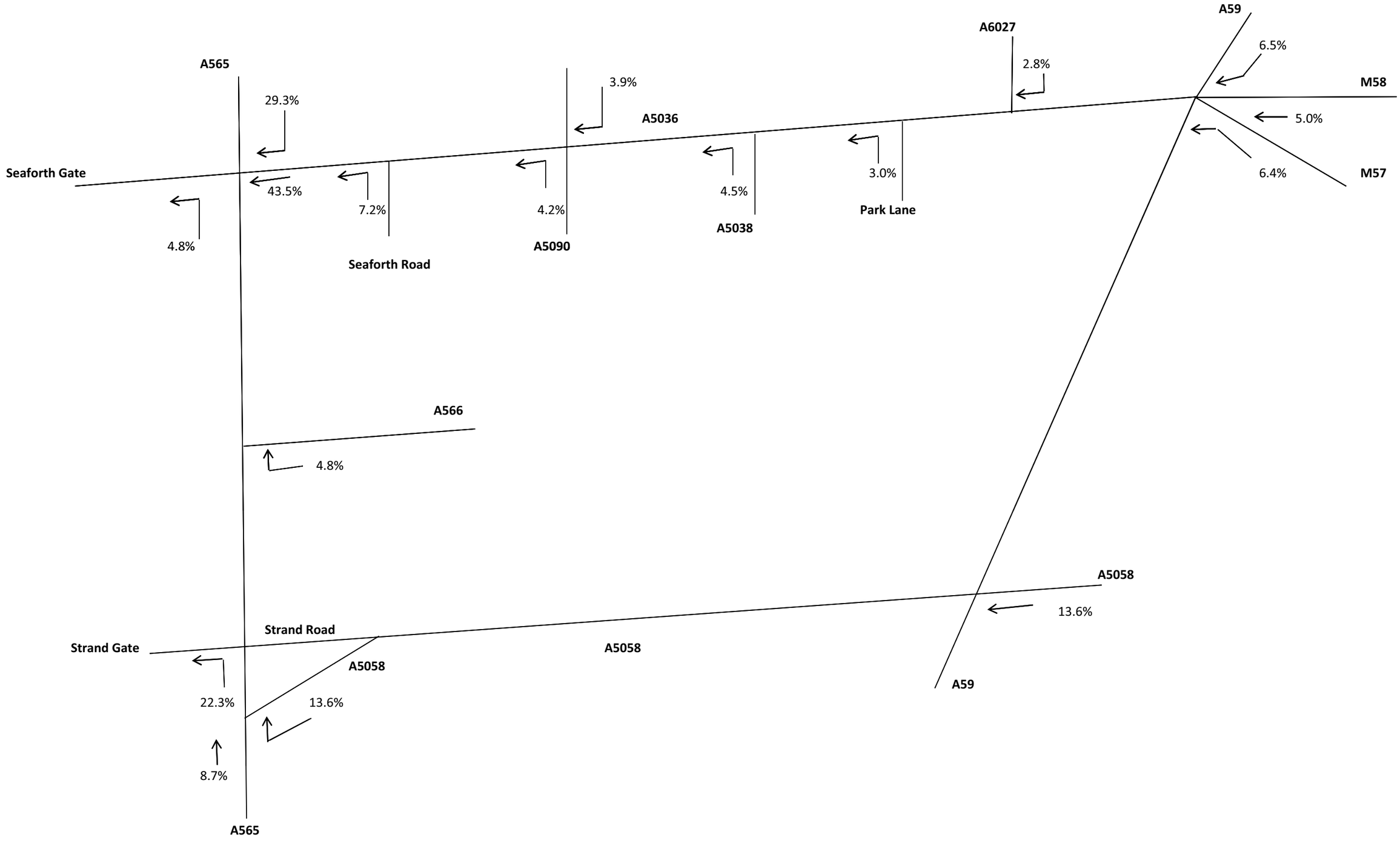


Figure 1 Distribution Pattern

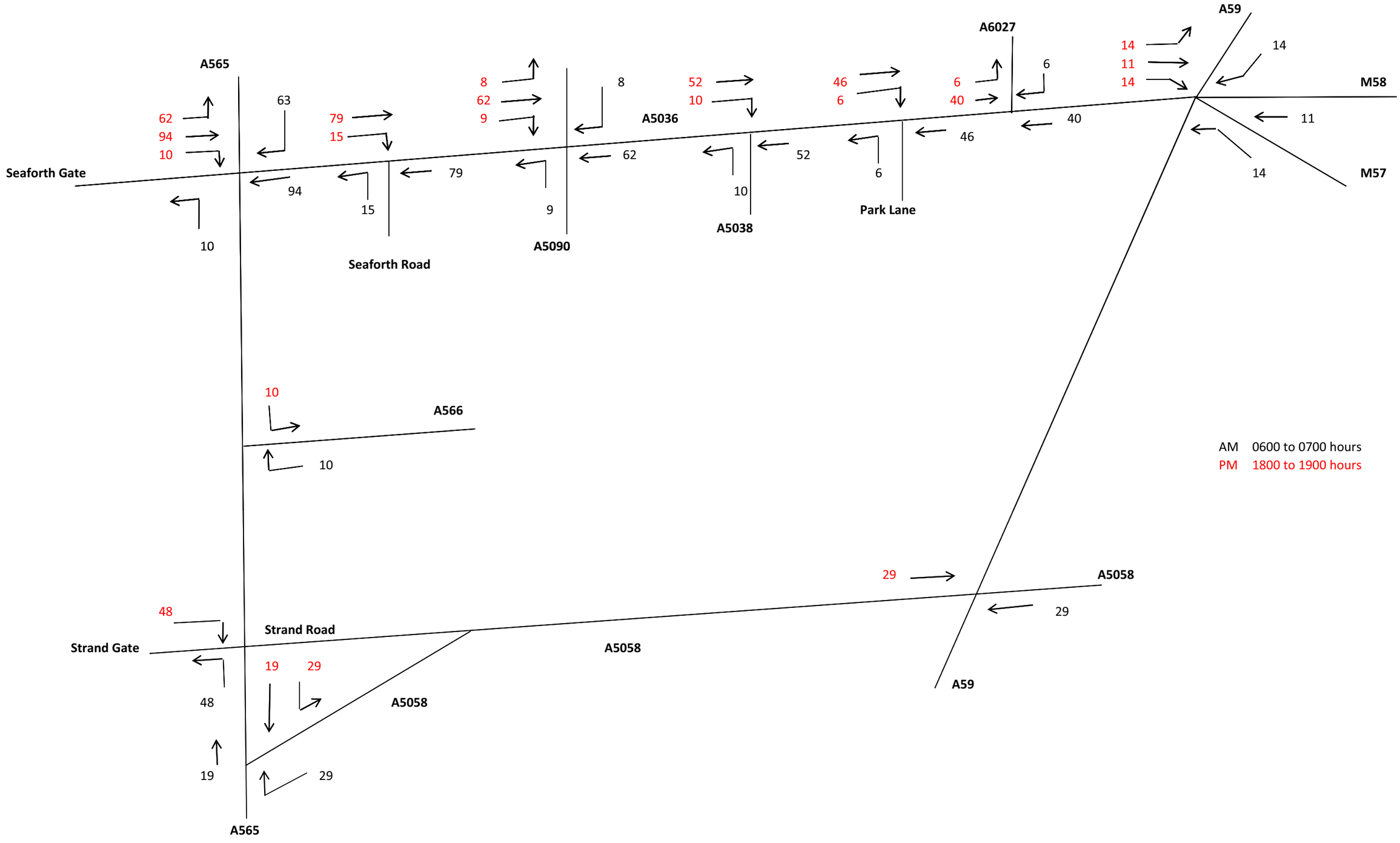


Figure 2 Construction Worker Traffic

CONSULATION PROFORMA

Consultee / Stakeholder	Name	Contact details
Highways Agency	Simon Clarke – Planning Manager – Strategic Planning Team	0161 930 5756 Simon.Clarke@highways.gsi.gov.uk
Method of contact	**Date of initial contact**	
Meeting / emails	1 February 2011	
Summary of correspondence		

Meeting to discuss the traffic and transport aspects of the project and talk through programme, access and the likely levels of both construction and operational traffic. Briefly discussed the potential scope of the supporting transport work and MD agreed to circulate a note summarising the project details and suggests a scope of work for discussion/agreement. SC indicated that he was very relaxed about the likely volumes of construction and operational traffic but would like to see some support for the numbers/assumptions that are adopted in the TA and EIA plus any information that can be provided on the profile for civil and mechanical works traffic, i.e. are there likely to be peaks over the construction period.

Emails to SC 11, 16 and 20 May 2011 and telephone conversation on 17 May 2011 to discuss the contents of the Scoping Statement circulated on 11 March 2011. SC confirmed that Highways Agency is generally content with the Scoping Statement subject to giving further consideration to the assessment year (maybe slip to 2016 or 2017) and including reference to relevant to local transport planning policies. SC formally provided Highways Agency comments in email dated 20 May 2011.

Email to SC 16 August 2011 regarding the demolition works and subsequent follow-up email on 15 September 2011. In email of 21 September, SC requested that the information on the demolition works be incorporated into the ESR.

CONSULATION PROFORMA

Consultee / Stakeholder	Name	Contact details
Liverpool City Council Highways	Jon Robinson – Team Leader Development Control Steven Walker –Development Control	0151 *** **** 0151 233 8123
Method of contact	**Date of initial contact**	
Meeting / emails	26 January 2011	
Summary of correspondence		

Meeting to discuss the traffic and transport aspects of the project and talk through programme, access and the likely levels of both construction and operational traffic. Briefly discussed the potential scope of the supporting transport work and MD agreed to circulate a note summarising the project details and suggests a scope of work for discussion/agreement. The issue of committed development was discussed and JR/SW indicated that a residential development at Stanley Dock (Ref 07F/0931 check planning website) would need to be taken into account in addition to those developments identified by MD. JR confirmed that SW would be the point of liaison with the transport assessment work. JR/SW were very relaxed about the likely volumes of construction and operational traffic, especially since the traffic would be travelling contrary to the peak directions of flow into and out of Liverpool.

Email to JR/SW 16 March 2011 and subsequent telephone conversation on 17 May to discuss the contents of the Scoping Statement circulated on 11 March 2011. SW confirmed, in email dated 18 May 2011, that Liverpool City Council is content with the Scoping Statement.

Email to SW on 16 August 2011 regarding demolition works. Follow-up emails on 15 and 21 September 2011. Email from SW on 21 September confirming that the demolition traffic proposals seem reasonable and requesting that the ESR plan showing the locations of the various access points.

CONSULATION PROFORMA

Consultee / Stakeholder	Name	Contact details
Sefton Council Highways	Brian Mason Team Leader Highways Development Control Peter Ovington Highways Development Control	0151 934 4175 Brian.Mason@sefton.gov.uk 0151 934 4593 Peter.Ovington@sefton.gov.uk
Method of contact	**Date of initial contact**	
Emails / telephone	18 January 2011	
Summary of correspondence		

Meeting to discuss the traffic and transport aspects of the project and talk through the programme, access and likely levels of both construction and operational traffic. Briefly discussed the potential scope of the supporting transport work and MD agreed to circulate a note summarising the project details and suggest a scope of work for discussion/agreement. BM stated that, with regard to operational traffic, he was very relaxed about 2-3 HGVs per hour per direction over 14 hours, 7 days a week but would be concerned if the numbers were up at 10-11 HGVs per hour per direction. BM suggested that the assessment work should look at traffic increases on key links during the peak hours for construction traffic, namely 0600 to 0700 hours and 1800 to 1900 hours. Some operational assessment will however be required for the Millers Bridge junction. Background traffic data may be available on the Council's Breatheasy website but a new traffic count is likely to be required for Millers Bridge. The issue of committed development was discussed and BM/PO indicated that a residential development at Queens Bedford would need to be taken into account in addition to those developments identified by MD. BM confirmed that PO would be the point of for the transport assessment work.

Emails to PO of 16 and 20 May 2011 and telephone conversation of 16 May to discuss the contents of the Scoping Statement circulated on 11 March 2011 and the proposed route of the cable. PO confirmed, in email dated 20 May 2011, that Sefton Council is content with the Scoping Statement and has no objection to the installation of the cable but requested that the construction management plan explain how the connection to the sub-station intends to be made in addition to explaining how the proposed development would be constructed.

Email to PO on 16 August 2011 regarding the demolition works and follow-up email on 15 September 2011. Telephone conversation with PO on 27 September in which PO highlighted that the Council has no initial concerns but will provide a formal response. Formal response received by email on 3 October 2011 highlighting a number of issues to be addressed in ES, namely, final destination of demolition loads and the disposal and transportation of asbestos waste.

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Appendix C Noise Monitoring Methodology

Noise Monitoring Methodology

BS4142

The relevant standard used in the UK to assess noise from industrial sources in mixed industrial and residential areas is BS4142:1997. This method uses a comparison between the measured background level in the area with the noise level generated by the industrial source to determine the likelihood of complaints from residents. The assessment conducted by SKM Enviros followed the BS4142:1997 methodology as described below.

BS4142:1997 stipulates the following with regards to the measurement equipment:

- Continuous noise levels measured in terms of LAeq,T using an integrating-averaging sound level meter conforming to type 2 or better of BS EN 60804
- Use of an acoustic or pistonphone calibrator confirming to BS7189 to check sensitivity of the monitoring equipment before and after measurements
- Independent verification and calibration of the noise monitoring equipment used by a UKAS-accredited acoustical calibration laboratory

During this assessment SKM Enviros used a Type 1 integrating-averaging sound level meter with an acoustic calibrator in the field. The meter was within calibration from a UKAS-accredited laboratory and a copy of the calibration certificate is included in this document.

Regarding the measurement methodology BS4142:1997 recommends:

- Measurement positions outside buildings which will give results representative of the specific noise level and background noise level at the buildings where people are likely to be affected.
- Reflections to be minimised by placement of the noise meter at least 3.5m away from any reflecting surface (except the ground).
- The preferred measurement height is 1.2 – 1.5m above the ground.
- Precautions against interference including siting of the sound level meter away from potential sources of electrical interference and conducting the measurement during times of favourable weather conditions; low wind speed (<5m/s), not raining and using an effective wind shield to minimise turbulence at the microphone. Recording of the prevailing weather conditions during monitoring is required.

SKM Enviros' chosen monitoring positions conformed to the above conditions and weather conditions were favourable for noise monitoring. A tripod was used to position the sound level meter at 1.2m above ground level. Descriptions of the weather conditions during background noise measurement are noted on the monitoring record sheets to follow. The locations selected by SKM Enviros as representative of the residential properties surrounding the site shown on Figure 6.1 together will all receptors. For the purposes of the assessment, each noise monitoring position was considered represenatative of the following receptors. .

NMP1 – **Church Gardens:** this location is representative of the noise levels at residential properties to the south east of the proposed development.

NMP2 – **Ronan Close:** this location is representative of the noise levels at residential properties to the east of the proposed development.

NMP3 – **Peel Road:** this location is representative of the noise levels at residential properties to the north west of the proposed development.

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Appendix D Daytime and Night-time Noise Monitoring Levels

Measured Daytime Background Noise Levels - 10 February 2011

Receptor		Measurement Times	Measured Baseline Noise Levels (dB(A))			
			L_{Aeq}	L_{A90}	L_{A10}	L_{Amax}
NMP1	Church Gardens	09:55 - 10:05	74.7	66.7	77.9	83.5
		10:05 - 10:15	75.7	66.9	77.7	96.2
		10:15 - 10:25	74.9	67.4	77.7	92.2
		10:25 - 10:35	75.9	67.2	77.5	96.3
		10:35 - 10:45	74.5	65.7	77.7	81.8
		10:45 - 10:55	75.7	67.0	77.8	94.9
NMP2	Ronan Close	11:25 - 11:35	73.8	63.7	77.4	83.3
		11:35 - 11:45	73.6	63.3	77.1	85.5
		11:45 - 14:55	73.9	65.1	77.1	85.5
		11:55 - 12:05	73.9	63.7	77.2	85.1
		12:05 - 12:15	74.0	65.0	77.6	82.4
		12:15 - 12:25	74.0	66.1	77.3	84.4
NMP3	Peel Road	09:55 - 10:05	67.7	57.7	71.2	82.1
		10:05 - 10:15	69.9	60.7	72.9	82.7
		10:15 - 10:25	68.5	60.1	71.6	84.0
		10:25 - 10:35	67.5	60.5	70.4	85.0
		10:35 - 10:45	67.7	59.1	70.8	80.8
		10:45 - 10:55	74.7	66.7	77.9	83.5

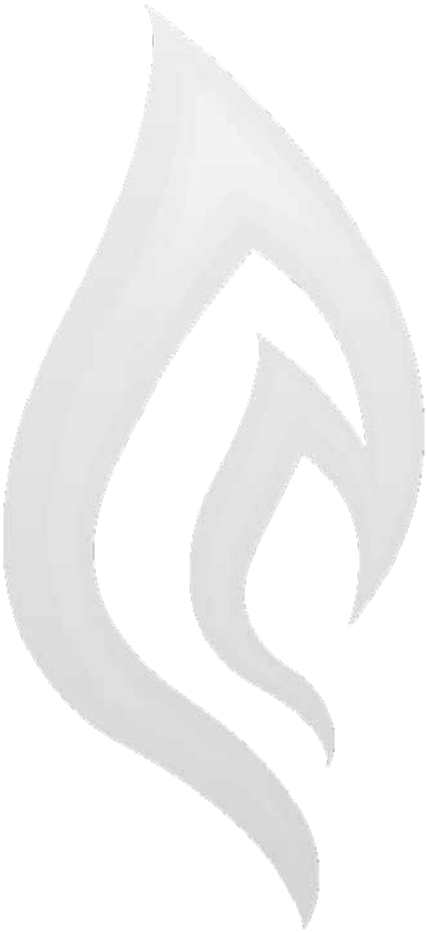
Measured Night-time Background Noise levels - 8 February

Receptor		Measurement Times	Measured Baseline Noise Levels (dB(A))			
			L_{Aeq}	L_{A90}	L_{A10}	L_{Amax}
NMP1	Church Gardens	03:15 - 03:20	58.9	46.5	61.9	78.4
		03:20 - 03:25	58.6	47.0	62.4	74.6
		03:25 - 03:30	60.7	46.7	64.6	76.8
		03:30 - 03:35	55.4	46.6	59.4	69.4
		03:35 - 03:40	57.1	46.2	58.9	72.9
		03:40 - 03:45	60.0	48.0	64.7	74.0
		03:45 - 03:50	53.3	46.9	56.3	69.9
		03:50 - 03:55	53.7	46.3	56.1	69.5
		03:55 - 04:00	59.4	47.2	63.7	73.9
		04:00 - 04:05	58.0	45.9	62.3	73.9
		04:05 - 04:10	54.3	46.2	54.0	71.8
		04:10 - 04:15	59.5	47.4	62.7	75.9
NMP2	Ronan Close	02:10 - 02:15	58.0	51.1	60.4	73.4
		02:15 - 02:20	60.9	51.1	62.9	77.4
		02:20 - 02:25	59.6	50.7	59.2	78.9
		02:25 - 02:30	63.1	51.7	66.4	78.9
		02:30 - 02:35	59.0	50.5	60.6	75.3
		02:35 - 02:40	59.4	51.6	63.9	72.5
		02:40 - 02:45	58.6	50.4	60.6	73.6
		02:45 - 02:50	59.9	51.3	62.7	75.2
		02:50 - 02:55	60.5	51.8	64.7	73.5
		02:55 - 03:00	62.0	51.2	66.7	77.9
		03:00 - 03:05	59.9	50.1	59.1	77.9
		03:05 - 03:10	58.4	50.8	60.5	73.2
NMP3	Peel Road	01:00 - 01:05	65.5	57.2	69.9	78.3
		01:05 - 01:10	64.5	56.2	68.0	78.5
		01:10 - 01:15	63.5	56.0	66.9	77.7
		01:15 - 01:20	62.2	56.2	64.6	74.9

Receptor		Measurement	Measured Baseline Noise Levels (dB(A))			
		01:20 - 01:25	63.0	56.0	67.2	74.6
		01:25 - 01:30	65.4	57.0	69.1	77.5
		01:30 - 01:35	64.6	57.5	69.3	74.3
		01:35 - 01:40	65.6	56.8	68.6	82.7
		01:40 - 01:45	66.6	58.1	69.9	80.7
		01:45 - 01:50	64.7	57.1	66.4	81.5
		01:50 - 01:55	66.8	57.1	70.3	80.1
		01:55 - 02:00	62.9	55.3	66.6	77.8

Alexandra Dock Renewable Energy Project
Environmental Scoping Report

Appendix E Archaeological Resources Information



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Map Ref.	Name	Ref	Date	Description	NGR
			SHIP WRECKS		
2	Baroda	906736	Post Medieval	1887 wreck of an English full rigged ship built in 1864.	SJ 32668 93550
3	Happy Return	906743	Post Medieval	Remains of British barge, 1898.	SJ 32950 93886
4	L M Merrity	906801	Post Medieval	Remains of Sailing Vessel, 1887.	SJ 32436 94078
5	Monument	892763	Uncertain	Unidentified obstructions - not further information is provided.	SJ 32824 94150
6	Monument	892764	Uncertain	Unidentified feature - no further information is provided	SJ 32972 94194
7	Flamingo	906806	Post Medieval	Remains of an 1886 wreck of a British steamship which foundered following a collision and was later dispersed.	SJ 32734 94290
8	Eton	906744	Post Medieval	Remains of an 1886 wreck of a British flat, a wooden sailing vessel.	SJ 32747 93889
9	George	906745	Post Medieval	Remains of an 1877 wreck of a British barge, a wooden sailing vessel which was en route from Liverpool.	SJ 32673 93920
10	Monument	1499387	Post Medieval	Two ship wrecks - timbers were discovered during dredging operation in Licence area 175/1 in the Mersey. The exact position is unknown.	SJ 31795 93886
11	Dunvegan Castle	906810	Post Medieval	1889 wreck of a British cargo vessel.	SJ 32555 94679
12	Monument	892765	Uncertain	Unidentified feature - no further information is provided.	SJ 32767 94676
13	Monument	892766	Uncertain	Probable wreck - no further information is provided.	SJ 32390 94790
14	Monument	892767	Uncertain	Unidentified feature, possible wreck - no further information is provided.	SJ 31561 94833
15	Monument	892768	Uncertain	Unidentified feature, possible wreck - no further information is provided.	SJ 31617 94894
16	City of Lisbon	906807	Modern	Remains of steamship, 1903	SJ 31941 94333
17	Coniston Fell	906803	Post Medieval	Remains of Cargo Vessel, 1899	SJ 31791 94180
18	Janie	906811	Modern	Remains of Sailing Vessel, 1916	SJ 31748 95046
19	Monument	892770	Uncertain	Unidentified feature, possible wreck - no further information is provided.	SJ 331613 395280
20	Tynemouth Castle	906805	Post Medieval	Remains of Steamship, 1898	SJ 32032 94239
21	Guess	906808	Post Medieval	Remains of an 1883 wreck of a British craft.	SJ 31646 94337
22	Guillermo	906739	Post Medieval	Remains of an 1885 wreck of a steamship.	SJ 31821 93701
23	Lido	906742	Post Medieval	Remains of an 1884 wreck of a British craft.	SJ 32119 93867
24	JC Swindlehurst	906814	Post Medieval	Remains of 1895 wreck of a British craft.	SJ 31181 95379
25	Midas	906737	Post Medieval	Remains of an 1881 wreck of a Welsh schooner.	SJ 31986 93621
26	Raven	906740	Post Medieval	Remains of an 1885 wreck of a British craft.	SJ 32200 93711
27	Hercules	906809	Post Medieval	Remains of Iron Steamship, 1896	SJ 31721 94398
28	Poolgarth	906733	Modern	Remains of British steel tug, 1940	SJ 32980 93453
29	George	906734	Post Medieval	Remains of barge, 1892	SJ 32464 93491
30	Innisfallen	906735	Modern	British motor vessel, 1940	SJ 332096 393542
63	Elizabeth	1432460	Post Medieval	1852 wreck of barque which stranded during a gale.	SJ 32480 94390
63	Ann	1046708	Post Medieval	Cargo Vessel, 1810	SJ 32480 94390
63	Kittiwake	1381980	Post Medieval	1897 wreck of a Welsh yacht built in 1875.	SJ 32480 94390
63	Avon	1383008	Modern	1916 wreck of an English cargo vessel built in 1880.	SJ 32480 94390
63	Helen McGregor	1382933	Modern	1915 wreck of an English schooner built in 1866.	SJ 32480 94390
63	Ann and Eliza	1358731	Post Medieval	Cargo Vessel, 1828	SJ 32480 94390
63	Britannia	1196969	Post Medieval	British Craft, 1817	SJ 32480 94390
63	Cunningham Boyle	1046690	Post Medieval	British Craft, 1815	SJ 32480 94390

Map Ref.	Name	Ref	Date	Description	NGR
			SHIP WRECKS		
63	Ellis	1338363	Post Medieval	1799 wreck of English craft.	SJ 32480 94390
63	Govenor Dodswell	1339003	Post Medieval	English Craft, 1802	SJ 32480 94390
63	Happy	1317608	Post Medieval	Cargo Vessel, 1750	SJ 32480 94390
63	Janet and Peggy	1338327	Post Medieval	British Craft, 1799	SJ 32480 94390
63	Little Liz	1364786	Post Medieval	1834 wreck of British cargo vessel.	SJ 32480 94390
63	Otway	1338771	Post Medieval	English Cargo Vessel, 1801	SJ 32480 94390
63	Pearl	1338301	Post Medieval	British Craft, 1799	SJ 32480 94390
63	Unity	1351244	Post Medieval	Welsh Craft, 1823	SJ 32480 94390
63	Maxim	1383049	Modern	1917 wreck of an English flat. Built in 1866.	SJ 32480 94390
63	Viola	1381632	Post Medieval	1896 wreck of a British cutter, built in 1869.	SJ 32480 94390
63	Fearless	1382416	Modern	1906 wreck of a British cargo vessel.	SJ 32480 94390
63	Gertrude	1382987	Modern	1915 wreck of an English cargo vessel, built in 1875.	SJ 32480 94390
63	Oglethorpe	1164390	Post Medieval	Craft, 1827	SJ 32480 94390
63	Flora	1382402	Modern	1905 wreck of a British cutter.	SJ 32480 94390
63	Vixen	1382875	Modern	1910 wreck of an English cutter, built in 1908.	SJ 32480 94390
63	Ajax	1381630	Post Medieval	1896 wreck of a British craft.	SJ 32480 94390
63	Minnie Jane	1382751	Modern	1909 wreck of an English flat, built in 1866.	SJ 32480 94390
63	South of New Brigton Stage	1382159	Post Medieval	1898 wreck of a British cutter following a collision in a gale. Built in 1891.	SJ 32480 94390
63	Asia	1382929	Modern	1914 wreck of an English flat, built in 1858.	SJ 32480 94390
63	Ingraban	1033670	Post Medieval	Russian Barquentine, 1884	SJ 32480 94390
			OTHER		
31	Monument	67577	Uncertain	A grooved stone axe of North American origin. Presumed to come from ballast discharged from ships.	SJ 32 94
32	1 Crescent Road, Seaforth	1458728	Post Medieval/Modern	The Presbytery of Our Lady Star of the Sea. A villa built circa 1860 for a local shipping family, brought in 1896 by the Roman Catholic Church and used as a Presbytery to the adjacent Church of Our Lady Star of the Sea. The villa is of two storey, with a partial basement. The house was originally L-shaped in plan and two wings were added to the rear circa 1903.	SJ 33075 96794
33	Monument	892760	Uncertain	Unidentified feature - no further information is provided	SJ 31983 93405
125	Kirkdale Industrial School	1451065	1840	The site of a former school and hospital: Kirkdale Industrial School was built in 1843. The school was built to relieve the workhouse of a significant increase in child inhabitants. However it soon suffered overcrowding of its own and by 1866 it accommodated 1,250 children. Boys were taught tailoring, shoemaking, and carpentering whilst girls were trained in knitting, needlework, cooking and general household work, which enabled them to gain employment as domestic servants. In addition boys were also taught as sailors. In 1904 the school closed and became Kirkdale Homes for the aged and infirm. This was taken over by West Derby Union in 1922 and then Liverpool City Council in 1929. A day room was built for mentally disabled (categorised i the terminology of the day as 'imbeciles') and epileptic patients in 1932. In 1948 the home was jointly run by Liverpool City Council and the Regional Hospital Board. By the early 1950s it was renamed Westminster House Home for Elderly People. In 1968 it closed and has now been demolished.	SJ 35043 93986
106	Monument	67401	15th - 16th Century	Bronze bottle	SJ 35 98
107	Monument	67415	Late Saxon	Cross base situated on the south side of St Mary's Church.	SJ 3588 9482
109	Monument	67436	Late Bronze Age	Flint arrowhead	SJ 37 94

Map Ref.	Name	Ref	Date	Description	NGR
OTHER					
105	Orrell Cross	67395	None provided	The pedestal of Orrell Cross stood on the road between Litherland and Fazakerley.	SJ 35 97
113	Rake House	512299	Early 19th Century	House	SJ 3661 9432
114	103 Cherry Lane, Walton	512300	Late 19th Century	A stable which was recorded at Rake House.	SJ 3661 9432
115	HMP Liverpool	520918		HMP Liverpool, formerly known as Walton Gaol, which was built to replace the Borough Gaol built in the late 18th century. The prison opened in the 1850s. In the 1900s women were imprisoned at HMP Liverpool for their involvement in protests undertaken during the women's suffrage movement.	SJ 3575 9610
117	Richmond Hill, Walton	891139	None provided	Earthworks of a moat at Edge Farm	SJ 339 998
118	Goodison Park	891142	1890s - 1990s	Goodison Park was opened in 1892 as the home of Everton FC. With various stands being built/refurbished or restructured between 1890s-1990s.	SJ 35908 93997
119	HMP & Yoi Altcourse	1144312	1996	Altcourse is the second DCMF (Design, Construct, Manage and Finance) private prison. It was due to open in December 1997.	SJ 37 95
121	The Prince Arthur	1408720	Mid 19th Century	The Prince Arthur is a public house which was remodelled circa 1905.	SJ 35914 95212
122	West Derby Union Workhouse (Liverpool Walton on the Hill Street)	1434171	1860s - 1930s	West Derby Union Workhouse (Liverpool Walton on the Hill site) was built between 1864-1869. It was built to accommodate 1200 inmates. In 1879 a school and children's wards were added. By 1925, the site had expanded to cover 35 acres. By 1930, the capacity had expanded to 2500 inmates. There were workshops, dormitories, an infirmary, a chapel and a children's quarantine block. As of the early 21st Century, most of these buildings were boarded up. The site is now (2005) known as Walton Hospital.	SJ 35886 95416
RELIGIOUS BUILDINGS					
34	Church of St John and St James	1513641	Modern	Built in 1910-11. In 1992 a link extension was constructed to connect the church hall to the church.	SJ 34714 96640
35	St Pauls Church	528136	Post Medieval/Modern	Church built in 1868 and made redundant in 1974.	SJ 338 959
36	St John and St James Church	536437	Modern	Anglican church built in 1910.	SJ 347 966
37	Church of St Thomas	528283	Post Medieval/Modern	Anglican parish church built in 1815.	SJ 33130 96768
108	Monument	67418	None provided	Site of churchyard cross and stocks which stood in St Mary's Church Churchyard.	SJ 3584 9477
INDUSTRIAL BUILDINGS					
38	41 Bankhall Street	1325305	Post Medieval	Three storey warehouse, built of brick with a slate roof. Built in 1874.	SJ 3425 9379
39	7 Bankhall Street	1325292	Post Medieval	Two storey warehouse, built of brick with an asbestos roof. Built in 1863.	SJ 3404 9373
40	Monument	1325445	Modern	Early 20th century warehouse in Brunswick Place.	SJ 33777 93923
41	Dunnett Street	1325645	Post Medieval	Brick warehouse with an asbestos roof, built c. 1875.	SJ 3385 9401
42	Effingham Street	1325656	Modern	Single storey warehouse built c. 1930	SJ 3367 9453
43	20 Forth Street	1327884	Post Medieval	Four storey, brick warehouse, built 1860 to 1880.	SJ 3410 9390
44	178 Regent Road	1330289	Modern	Seven storey warehouse, built of brick with a slate roof. Early 20th century date.	SJ 3377 9388
45	Bankfield Grain Silo	1332734	Modern	Grain silo built in the 1950s.	SJ 33821 93793
46	Cunards Shellworks Liverpool	1078897	Modern	Engineering works engaged in the manufacture of 4.5, 6 and 8-inch shells. Five single storey store buildings which comprised part of the works survive.	SJ 3325 9615
47	His Majesty's Factory Litherland	1078019	Modern	Formerly the Brotherton and Company tar distillers, known to have been important suppliers of toloul for the explosives industry during the Great War.	SJ 33 97
48	Harland and Wolff Shipbuilding and Engineering Works	1438958	Modern	Offices to the Harland and Wolff Shipbuilding and Engineering Works opened in 1913. The rest of the works has been demolished.	SJ 33625 94386

Map Ref.	Name	Ref	Date	Description	NGR
			INDUSTRIAL BUILDINGS		
49	Gas Holder	1440365	Post Medieval	Gasholder probably built in the late 19th century. A circular construction made out of cast iron. Historical maps of 1843 -1893, which show eight gasholders on the site at Litherland Road and the style, suggest the early dating.	SJ 34445 95950
50	War Production Factory	4042	World War II	Destroyed	SJ 310 943
50	New Brighton	1414609	Modern	Site of Second World War munitions factory	SJ 310 943
51	Tate and Lyle	960665	Modern	Sugar silo's built in 1957. Built of reinforced concrete with a pre-stressed concrete floor. Parabolic tunnel vaulted roof with six external ribs dividing the twelve sections.	SJ 338 935
51	Tate and Lyle	960666	Post Medieval	Control tower at Tate and Lyle sugar refinery. Constructed in 1955.	SJ 338 935
51	Tate and Lyle	960667	Modern	Warehousing forming part of the first phase of construction at Tate and Lyle's works. Built between 1934 and 1966.	SJ 338 935
			RECREATION/SPORTS/HEALTH		
52	New Brighton Tower and Grounds	1458285	Post Medieval/Modern	Built between 1896 and 1900 at a cost of around £120,000. It was approximately 567 feet tall and was constructed of over 1,000 tons of steel. It attracted around half a million visitors each year. The theatre could accommodate 3,500 people and had the largest stage in the world measuring 45 feet wide and 72 feet deep. The Tower Gardens, covering 35 acres, included a Japanese Cafe, Venetian Gondolas, Parisian Tea Garden and outdoor dancing platform. The 'Old English Fairground' provided a switchback railway, water chute, lion house and menagerie. There was also an athletic ground where the World Cycling Championship was held in 1922. The ground, which had a capacity of 80,000, was home to New Brighton Tower Football Club of League Division Two. Other attractions at the tower included a roller skating rink, shops and a bazaar. The tower was illuminated at night with around 30,000 fairy lights. During the First World War, it was neglected and fell into disrepair. It was dismantled between 1919 and 1921. In 1969, a fire destroyed the buildings below, including the ball room and theatre.	SJ 31223 93911
53	New Brighton Pier	67589	Post Medieval	Built between 1866 and 1867. It was repaired and modified between 1928 and 1930 and a pavilion was erected. The pier closed in 1865 but re-opened in 1968. Around £200,000 was spent on repairs and improvements before it again closed in 1972. It was demolished in 1977 after it was deemed unsafe.	SJ 31356 94162
54	Gainsborough Cinema	1440151	Modern	Cinema and later Bingo Hall built in the early 20th century, approximately in the late 1920s. The building has been demolished between 2002 and 2006.	SJ 33685 96342
55	Bootle Cricket Ground	1462735	Modern	The club was founded in 1833 and moved to the ground from Irlam Road in 1884.	SJ 34706 94659
56	Seaforth Greyhound Stadium	1466825	Modern	Opened in 1933 and was located between Crosby Road South and Church Road. It was the fourth to be built in the city. The stadium closed in 1965 and was purchased by Crosby Corporation to be replaced by housing.	SJ 32867 96637
57	Bootle Open Air Swimming Pool	1441939	Modern	Opened in 1902. The pool was destroyed in World War II.	SJ 33746 95844
58	Bootle Baths	1176051	Post Medieval/Modern	Bootle Baths were built in 1888 . The baths included a 100 feet male pool, a 60 feet female pool and a range of drying racks. The baths closed in 1998 but the original facade was retained.	SJ 34111 94723
59	Bootle Royal Borough Hospital	1073651	Post Medieval/Modern	Founded as Bootle Borough Hospital and built in 1870-72. Extended in 1885-87. A nurses home was added 1913-1915, and an outpatients department was added in 1932.	SJ 336 948
123	Queens Drive Public Baths	1442154	1900s	Queen's Drive public baths opened in 1909. The baths closed in the late 20th century.	SJ 35956 94913

Map Ref.	Name	Ref	Date	Description	NGR
			RECREATION/SPORTS/HEALTH		
124	Stanley Park Swimming Baths	1442158	1920s	Stanley Park Swimming Baths were built in the corner of the lake by Walter Spencer of Aintree in 1923. It closed in August 1960 and no traces of the pool now (2007) exist.	SJ 36041 93800
127	Olympic Bowling Club	1462733	1890s	The Olympic Bowling Club was formed in 1892 and is situated on Park Vale Road, Walton Vale.	SJ 36411 96553
128	Orrell Mount Sports Ground & Pavillion	1462334	1920s - 2006	Orrell Mount Sports Ground and Pavilion was created by Silcocks animal feed company in around 1923. The sports ground was founded in order to improve the health of the workforce and to aid the recruitment of new employees. The sports pavilion was refurbished shortly before 2006 for use as a youth and community centre by Sefton Council. The sports ground provides a tennis court, bowling green, children's playground and playing fields. The pavilion is constructed of timber with a swept-out red tiled roof covering a veranda around the exterior.	SJ 34512 97319
			DOCKS		
1	Hornby Dock	1440200	Post Medieval	Constructed in 1880-83 and was the most northerly dock of the time. It was mainly used by the timber trade and featured a sloping quay, similar to that at Brunswick Dock. The lock entrance suffered bad bomb damage during World War II. Today the dock has partially been infilled to provide land for the Powergen coal terminal. The surviving dock is currently used to import coal.	SJ 32780 95359
60	Alexandra Dock	1440081	Post Medieval	Constructed between 1874-82, covering an area of 17.8 hectares. The dock is currently in use; in 1998 it became part of the Liverpool Freeport and is at the heart of the modern docks. Until construction of the Royal Seaport Dock it was one of Liverpool's grain terminals. It also dealt	SJ 33004 94997
61	Brocklebank Dock	1440097	Post Medieval/Modern	The dock was originally part of the Canada Dock complex and known as Canada Half Tide Dock, opened in 1862 and dealt mainly with timber. In 1879 the dock was renamed Brocklebank. The dock was rebuilt in 1904-8 and again in 1958 when the second Langton River Entrance was constructed. The dock is currently in use by the Liverpool to Belfast ferry service.	SJ 33373 94346
62	Gladstone Dock	1440162	Modern	Constructed 1909-27, comprised an entrance dock, two branch docks, three miles of quays and single, double and triple transit sheds, covering an area of 19.8 hectares. In 1913 the graving dock, now a wet dock, was constructed and was in full use during the two World Wars. In 1998 the dock became part of the Liverpool Freeport and is currently in use.	SJ 32525 95923
			DOCKS		
64	Langton Dock	1440211	Post Medieval/Modern	It was partly operational in 1879, officially opened in 1881 and was used mainly by vessels on the Mediterranean routes. A new river entrance to the dock was opened in December 1962. Currently the dock is used for general cargo trades.	SJ 33166 94571
65	Royal Seaforth Dock	1440261	Post Medieval	A modern container dock opened in 1971 and handles containerised traffic from North and South American and Africa, and also timber and cereal. In 1998 the dock became part of the Liverpool Freeport forming the heart of the present port.	SJ 32082 96385
66	Canada Dock	1030990	Post Medieval	Constructed in 1859 and originally covered an area of 7 hectares. The dock was based away from the other docks as timber berths were considered a fire risk. The dock is still in use providing a roll on- roll off berth, and facilities for oil, bulk and general cargoes.	SJ 33442 93813
			RAILWAY STATIONS AND BRANCHES		
67	Bank Hall Station	1373212	Post Medieval	Railway station on the Liverpool, Crosby and Southport Railway opened in 1850.	SJ 3450 9385
68	Kirkdale Station	499725	Post Medieval	Railway station on the Liverpool and Bury Railway opened in 1848.	SJ 348 942

Map Ref.	Name	Ref	Date	Description	NGR
RAILWAY STATIONS AND BRANCHES					
69	Canada Dock Station	499686	Post Medieval/Modern	Site of a passenger railway station on the Liverpool Overhead Railway. Opened on the 6th March 1893. The station was originally served by trains operating between Herculaneum Dock and Alexandra Dock stations. The station was closed in 1956 and demolished late 1957.	SJ 33771 93590
70	Seaforth Cavalry Barracks	1073721	Post Medieval	Barracks hospital built 1884 as part of newly-founded cavalry barracks. Now demolished.	SJ 3275 9730
71	Gladstone Dock Station	499708	Post Medieval/Modern	Site of a passenger railway station on the Liverpool Overhead Railway. Opened in 1930. The station was closed in 1956 and demolished late 1957.	SJ 32970 95791
72	Alexandra Dock Station	499664	Post Medieval/Modern	Warehouse, formerly a railway station serving Alexandra Dock, opened in 1880. Closed to passengers in 1948 although was used as a goods station until 1967.	SJ 33427 95020
73	Balliol Road Station	499679	Post Medieval/Modern	Late 19th Century railway station on the Liverpool, Crosby and Southport Railway. Closed in	SJ 340 947
74	Bootle New Strand Station	499734	Post Medieval	Railway station on the Liverpool, Crosby and Southport Railway, opened in 1850.	SJ 334000 395500
75	Oriel Road Station	499680	Post Medieval	Railway station on the Liverpool, Crosby and Southport Railway, opened in 1850.	SJ 339 949
76	Alexandra Dock Station	499663	Post Medieval/Modern	Site of passenger railway station on the Liverpool Overhead Railway. Opened in 1893. The station was closed in 1956 and demolished late 1957.	SJ 33335 95134
77	Brocklebank Dock Station	499682	Post Medieval/Modern	Site of a passenger railway station on the Liverpool Overhead Railway. Opened in 1893. Originally served by trains between Herculaneum Dock and Alexandra Dock stations. The station was closed in 1956 and demolished in late 1957.	SJ 33546 94530
78	Langton Dock Station	499727	Post Medieval/Modern	Site of a passenger railway station on the Liverpool Overhead Railway. Opened in 1896. Originally it was served by trains between Dingle and Seaforth Sands stations. The station was closed in 1906.	SJ 33434 94847
79	Seaforth and Litherland Station	499764	Post Medieval	Railway station on the Liverpool, Crosby and Southport Railway, opened in 1850.	SJ 333 970
80	Seaforth Sands Station	499765	Post Medieval/Modern	Site of a passenger railway station on the Liverpool Overhead Railway. Opened in 1894 and was situated on the west side of Crosby Road South, Knowsley Road and Primrose Road junction. The railway was further extended and opened in 1905. Alterations to the station took place at this time. The station was closed in 1956 and demolished in late 1957.	SJ 32992 96299
81	Alexandra Dock Branch Railway	1370646	Post Medieval	The Alexandra Dock Branch line was opened in 1880. The junction with the Bootle line continued to be known as Atlantic Junction. Passenger services to Alexandra Dock ceased in 1848.	SJ 34 94
82	Fazakerley and North Mersey Branch Railway	1370654	Post Medieval/Modern	The Fazakerley and North Mersea Railway opened as a goods line in 1867 from Fazakerley Junction on the Liverpool - Bury line to North Mersea Goods Station near Langton Dock. Closed in the 1950s.	SJ 33 96 to SJ 38 97
83	Langton Dock Railway	1370690	Post Medieval/Modern	The Langton Dock Railway opened from Fazakerley North Junction to Langdon Dock in 1885, the line closed in 1970.	SJ 33 95 to SJ 36 95
110	Preston Road Station	499749	1800s	Railway station on the Liverpool and Bury Railway which was opened in 1848.	SJ 361 960
111	Spellow Station	499772	1800s	Site of railway station on the Edgehill and Bootle Railway which was opened in 1866 and then later closed in 1948.	SJ 357 944
112	Walton Junction Station	499792	1800s	Railway station on the Liverpool, Ormskirk and Preston Railway which was opened in 1849.	SJ 359 959
116	Walton on the Hill Station	526697	1800s	Site of railway station on the Aintree and Halewood Branch Railway which was opened in 1879. In 1918 it was closed to passengers and closed in entirety in 1968.	SJ 359 950
120	Liverpool Crosby & Southport Railway	LINEAR 1244	1840s	The Liverpool, Crosby and Southport Railway which was opened in 1847.	SJ 34 95 to SD 33 17

Map Ref.	Name	Ref	Date	Description	NGR
SECOND WORLD WAR					
84	Monument	1476579	Modern	Second World War air raid shelters are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 335 958
85	Monument	1476581	Modern	Second World War air raid shelters are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 327 968
86	Monument	1476583	Modern	A searchlight battery and associated military buildings are visible as structures and earthworks on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3235 9617
87	Monument	1476584	Modern	A Second World War potential pillbox and barbed wire obstruction are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3259 9650
88	Monument	1476585	Modern	A Second World War barrage balloon site is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3253 9685
89	Monument	1476589	Modern	Two sections of barbed wire obstructions, dating to the Second World War, are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3242 9693
90	Monument	1476593	Modern	A Second World War pillbox is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography	SJ 3236 9697
91	Monument	1476594	Modern	A Second World War pillbox is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3228 9714
92	Monument	1476595	Modern	A Second World War minefield and barbed wire obstructions are visible as structures and earthworks on air photographs. Some of these barbed wire obstructions form the perimeter of the minefield. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 322 971
92	Monument	1476598	Modern	Second World War tank traps and barbed wire obstructions are visible as structures on air photographs. The tank trap consists of lines of anti-tank pimples. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 322 971
93	Monument	1476597	Modern	A Second World War pillbox is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3209 9732
94	Monument	1476624	Modern	A Second World War barrage balloon site and associated military building are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3342 9521
95	Monument	1485835	Modern	A Second World War barrage balloon site is visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3255 9693
96	Gladstone Dock Heavy Anti Aircraft Battery	1474064	Modern	General location of the site of a First World War heavy anti aircraft battery at Gladstone Dock which was armed with a 3-pounder gun in 1917.	SJ 328 961
97	Heavy Anti Aircraft Battery Mersey H3	1472983	Modern	A Second World War heavy anti aircraft battery, military camp, radar station, barbed wire obstructions and military roads are visible as structures and earthworks on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography. It was armed with four 5.25-ich guns with GL Mark II radar in 1942.	SJ 324 973
98	Monument	1475935	Modern	A Second World War barrage balloon site is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3370 9466

Map Ref.	Name	Ref	Date	Description	NGR
SECOND WORLD WAR					
99	Monument	1475937	Modern	Second World War air raid shelters are visible as structures on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3384 9447
100	Seaforth Battery	1484355	Post Medieval/Modern	Built as part of the fixed defences on the Mersey, in the 19th century. The battery was in use during the First World War and abandoned in the late 1920s. The battery has since been removed and the site is now occupied by Gladstone docks.	SJ 322 960
101	Perch Rock Battery	1429176	Post Medieval/Modern	Built between 1826 and 1830 as part of the fixed defences on the Mersey. It was remodelled between 1894 and 1899. The battery was active during the Second World War and by 1943 was manned by the Home Guard. It was reduced to care and maintenance in 1944. The eastern-most emplacement is in good condition, but the western one has suffered some deterioration. Otherwise the battery remains in reasonable condition.	SJ 30962 94489
102	Monument	1475808	Modern	A Second World War road block is visible as a structure on air photographs. No surface features are visible on the latest 1982 Meridian Airmaps Ltd vertical photography.	SJ 3118 9415
103	Coast Battery	15091	Second World War	No further information provided other than reference to documentation.	SJ 309 946
104	Coastal Battery	4020	Pre-World War I to World War II	Condition recorded as good.	SJ 309 945
126	Rocket Projector Battery Zh4	1454805	Second World War	Site of Second world War rocket projector battery ZH4 near Walton Hospital.	SJ 355 954

The above information has been sourced and summarised from archaeological databases on the world wide web

Alexandra Dock Renewable Energy Project
Environmental Scoping Report

Appendix F Site Photographs taken from Geotechnical and Geo-Environmental Desk Study 2010

power for good

Maritime Site from P&O

Maritime Entrance (Surface Drainage)

Shed (South of Maritime)

Maritime Site

APPENDIX B – SITE PHOTOS
AREA 3 – P&O FERRIES LORRY PARK SITE

P&O Ferrymasters Site

P&O Ferrymasters Site

P&O Surfacing

Former Quay Wall

Disused Bollard & Damage Ground – AAA Car Auctions

Henry Bath Sheds – AAA Car Auctions

APPENDIX B – SITE PHOTOS
AREA 5 – JMD HAULAGE CONTRACTOR'S SITE

JMD In Gate

Spoil Heap

JMD Parking Area

JMD Parking Area

Disused Bollard Adjacent to Rock Bund

Hazardous Cargo Bays – JMD Parking Area

APPENDIX B – SITE PHOTOS
AREA 6 – CARGILL GRAIN SHED

Cargill Grain Shed

Cargill Grain Shed

Cargill Grain Shed

Road Surface Between Alexandra & Hornby Sheds

APPENDIX B – SITE PHOTOS
AREA 7 – HENRY BATH METALS SHEDS

Henry Bath Sheds – AAA Car Auctions

Henry Bath Shed

Henry Bath Shed

Henry Bath Shed

Pavement Surface – Henry Bath Shed

Henry Bath Shed

Pavement Surface – Henry Bath Shed

Henry Bath Shed

Henry Bath Shed

Henry Bath Shed

APPENDIX B – SITE PHOTOS
AREA 8 – ALEXANDRA QUAY WEST SHED

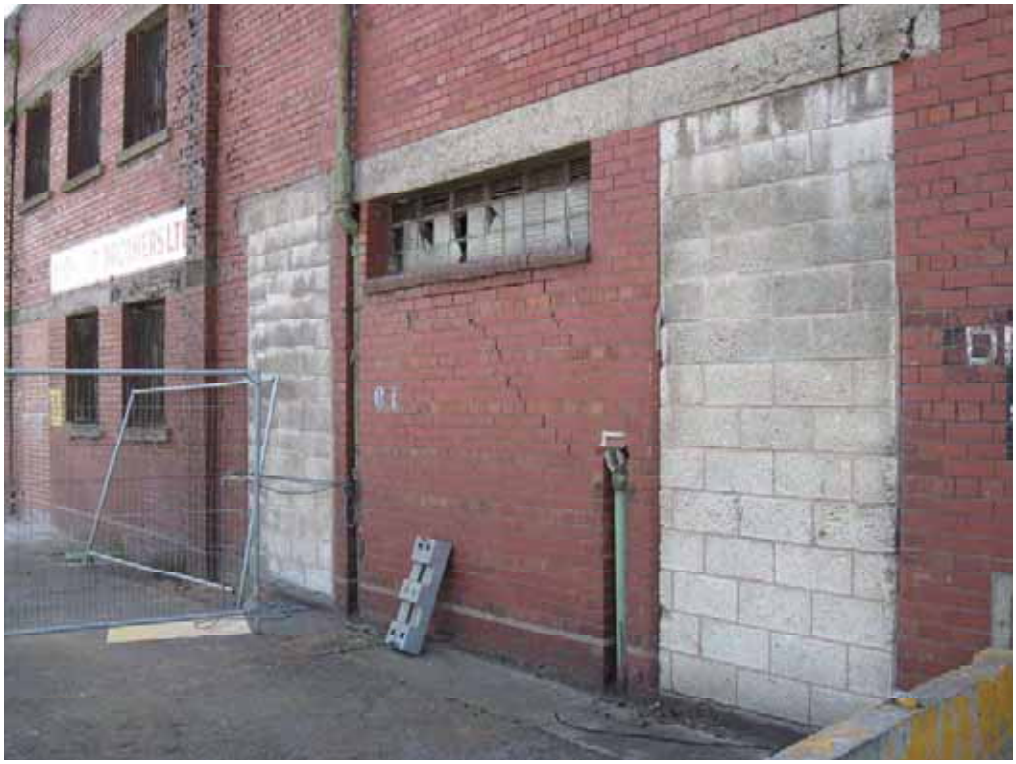
Snowdrop Ferry – Alexandra West Shed

Canada 90’ Swing Bridge Hydraulic Controls

Canada 90’ Swing Bridge Hydraulic Controls

Alexandra West Shed

Alexandra West Shed



Cracking in Alexandra West Shed

Grain Stored in Alexandra West Shed

Cracking in Alexandra West Shed

Alexandra Quay
West Shed

APPENDIX B – SITE PHOTOS
AREA 9 – ALEXANDRA QUAY CENTRAL SHED

Alexandra Central Shed

Fly Tipping – Alexandra Central Shed

Fly Tipping – Alexandra Central Shed

Grain Overflow Through Door – Alexandra Central Shed

APPENDIX B – SITE PHOTOS
AREA 10 – ALEXANDRA QUAY EAST SHED

Empty Oil Drums – Alexandra East Shed

Humber Progress Oil Tanker – Alexandra East Shed

Alexandra East Shed

Gas Storage at Alexandra East Shed

Alexandra East Shed

APPENDIX B – SITE PHOTOS
AREA 11 – WEST RIVER WALL

View into Gladstone Lock

River Wall

River Wall Timber Storage

River Wall Timber Storage

River Wall

View into Gladstone Lock

River Wall Inter-ceptor

River Wall Timber Storage