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# Green Port Hull Environmental Statement: Non Technical Summary

November 2011



Prepared for

**ABP** Associated British Ports

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## Revision Schedule

### Environmental Statement: Non Technical Summary November 2011

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	Nov 2011	Final	<b>Laura Morrish</b> Environmental Consultant	<b>Kirsty Cobb</b> Associate	<b>Neil Stephenson</b> Technical Director

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# 1 Introduction

- 1.1 Associated British Ports (ABP) wishes to develop a facility at Alexandra Dock, in the Port of Hull, for the manufacture, assembly, testing and shipment of wind turbines for the offshore wind power industry. The facility, which will be known as Green Port Hull (GPH) will be designed to service the need for additional renewable energy identified by Government in its Round 3 off-shore wind energy programme. On completion, the site will be operated by Siemens plc (“Siemens”), who are joint applicant with ABP for some of the GPH consents applied for.
- 1.2 This document provides a non-technical summary (NTS) of the Environmental Impact Assessment (EIA) that has been carried out for the proposed development. Technical details of the EIA are provided in the main Environmental Statement (ES).
- 1.3 EIA is a formal process for identifying the potential environmental impacts of a proposed development and assessing the significance of any likely environmental effects that may result. It considers ways to reduce adverse effects (mitigation measures). ABP must carry out an EIA for the proposed GPH development to satisfy the requirements of the Town and Country Planning (Environmental Impact Assessment)(England and Wales) Regulations 2011 and the Marine Works (Environmental Impact Assessment) Regulations 2007, and submit the findings with the consent applications to Hull City Council and the Marine Management Organisation respectively.
- 1.4 Key environmental topics to be considered in the EIA for GPH were identified through a scoping exercise. A Scoping Report was prepared describing the proposed development and setting out which environmental issues were to be considered in the EIA (and which were not). The Scoping Report was submitted for consultation to the Hull City Council and the Marine Management Organisation in March 2011 who consulted a range of organisations.
- 1.5 The EIA considers the following environmental topics:
- planning policy;
  - socio-economics;
  - land uses and recreational activities;
  - traffic and transportation;
  - noise and vibration;
  - air quality and dust;
  - coastal and estuarine processes;
  - water quality, drainage and flood risk;
  - ornithology;

- 
- marine ecology and nature conservation;
  - landscape and visual amenity;
  - cultural heritage;
  - commercial and recreational navigation;
  - land quality;
  - waste management;
  - shadow flicker assessment (during operation of the on-site turbine);
  - electromagnetic interference (during operation of the on-site turbine); and
  - aviation assessment (during operation of the Helicopter Landing Site).

- 1.6 For each topic of the EIA, the current conditions are identified and then the changes ('impacts') that are predicted to result from the construction and operation of the proposed development are identified. The results of the predicted changes on the environment are called 'effects'. Effects are described as 'significant' or 'not significant'. Significant effects are those which are considered to be important (for example due to the sensitivity or importance of the environment receptor, or the scale of the change) and may require mitigation measures (measures to reduce their effects).
- 1.7 In order to consider the possible changes resulting from the proposed development it is also necessary to assess any other changes that may occur in future without the proposed development.
- 1.8 The EIA has been prepared by URS Scott Wilson with input from specialists. The authors of specialist chapters are listed in Table 1.

**Table 1: Specialist EIA chapter authors**

Chapter	Title	Authors
Chapter 1	Introduction	URS Scott Wilson
Chapter 2	The Proposed Development and Need and Alternatives	URS Scott Wilson
Chapter 3	Planning Policy	URS Scott Wilson
Chapter 4	Socio-Economics	URS Scott Wilson
Chapter 5	Land Uses and Recreational Activities	URS Scott Wilson and ABPmer
Chapter 6	Traffic and Transportation	JMP Consultants Limited
Chapter 7	Noise and Vibration	Bureau Veritas
Chapter 8	Air Quality and Dust	URS Scott Wilson
Chapter 9	Coastal and Estuarine Processes	ABPmer
Chapter 10	Water Quality, Drainage and Flood Risk	URS Scott Wilson
Chapter 11	Ornithology	URS Scott Wilson
Chapter 12	Marine Ecology and Nature Conservation	ABPmer
Chapter 13	Landscape and Visual Amenity	URS Scott Wilson
Chapter 14	Cultural Heritage	URS Scott Wilson
Chapter 15	Commercial and Recreational Navigation	ABPmer
Chapter 16	Land Quality	URS Scott Wilson
Chapter 17	Waste Management	URS Scott Wilson
Chapter 18	Shadow Flicker (During Operation)	URS Scott Wilson
Chapter 19	Electromagnetic Interference (During Operation)	URS Scott Wilson
Chapter 20	Aviation Assessment (During Operation)	Cyrrus Limited
Chapter 21	Cumulative and Combined Effects	URS Scott Wilson/
Chapter 22	Summary of Significant Environmental Effects	URS Scott Wilson/ JMP Consultants Limited / Bureau Veritas/ ABPmer/ Cyrrus Limited

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## 2 The Proposed Development and Need and Alternatives

- 2.1 ABP propose to develop a facility at Alexandra Dock, in the Port of Hull, for the manufacture, assembly, testing and shipment of wind turbines for the off-shore wind power industry. A site location plan showing the location of GPH is provided at Figure A.
- 2.2 The new facility will be designed to service the need for additional renewable energy identified by Government in its Round 3 off-shore wind energy programme. On completion, the site will be operated by Siemens.
- 2.3 In summary, the proposals include the reclamation of 7.5 hectares of land from the Humber Estuary, already consented, as noted below, for development as a Lift-on Lift-off (Lo/Lo) container terminal under a Harbour Revision Order. This will be used as a new quay for the import and export of wind turbine components and, potentially, the examination and export of fully erected wind turbines. In addition to this consented reclamation, the principal elements of the GPH development will include a factory for the manufacture, assembly and production of wind turbine equipment, related office space, an area for the storage and testing of wind turbine components, a vessel crew facility, a further quay to be constructed within Alexandra Dock, a permanent operational on-site wind turbine, a helicopter landing site and associated infrastructure.
- 2.4 Government policy has committed the UK to achieving 15% of energy production from renewable sources by 2020. A programme for the delivery of up to 25GW of new off-shore wind farm sites by 2020 will make a significant contribution to this target. The scale of wind farm development in the North Sea, however, requires a dedicated facility at a port with sufficient capacity for the manufacture, assembly and testing of wind turbines, together with the ability to load them onto specialised installation vessels for final erection at sea. In terms of sustainability and operational practicality, therefore, it is pertinent to note that three of the largest proposed off-shore wind farm zones are located close to the Humber Estuary and the Port of Hull.

### Description of the Site Today

- 2.5 The boundary of the proposed development site is shown in Figure B. A number of ABP's tenants and occupiers are located within that part of Alexandra Dock which is to be developed and which presently handles a range of solid and liquid materials. Existing buildings and structures at the Docks are up to 30 m high and dock cranes are approximately 40 m high.
- 2.6 The walls of Alexandra Dock and the Hydraulic Engine House and Tower are 'listed' structures and fall within the proposed development site.
- 2.7 A public footpath runs within the proposed development site along the bank of the Humber Estuary. This footpath ends at Lord's Clough where it becomes a dead-end. It is intended that this footpath will have been diverted prior to the commencement of construction works for the GPH development via a separate application.



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- 2.8 To the south of the footpath there is a partly used jetty (lying within the boundary of the proposed reclaim) and the Humber Estuary. The jetty is known as 'west jetty'.
- 2.9 Consent has already been granted for a container terminal development known as Quay 2005 (also known as Hull Riverside Container Terminal) at the south-western corner of the proposed GPH site. This consent was given under the ABP (Hull) Harbour Revision Order (HRO) 2006. It has, however, never been implemented. The HRO authorises the reclamation of approximately 7.5 ha of new land (from the Humber Estuary) and the construction of a new quay, together with the dredging of two new berths for mooring ships.

## Description of the GPH Proposal

- 2.10 The proposed development site covers approximately 56 ha including the approximately 7.5 ha of reclaimed land already consented by the Quay 2005 HRO.
- 2.11 The existing tenants and occupiers within the proposed development site will be relocated, mainly within the Port of Hull.
- 2.12 The layout of the proposed GPH development is shown in Figure B. The main elements are:
- a factory for the production of wind turbine equipment (principally nacelles) to be used in offshore wind turbines;
  - office space and welfare facilities;
  - a vessel crew facility to be used for ship based personnel including mess area and personal storage facilities;
  - a plant room;
  - three security/ induction facilities;
  - open areas for the storage, handling, assembly and testing of wind turbines components and, potentially, the erection of wind turbines prior to shipping;
  - the partial infill of Alexandra Dock for port operational use, essentially for handling of traffic associated with the wind turbines;
  - a new quay with two berths already consented for development as a Lo/Lo container terminal (under the Associated British Ports (Hull) HRO 2006);
  - a bird roosting platform (agreed as part of the Associated British Ports (Hull) HRO 2006);
  - a 5 m high noise barrier (consented under the Associated British Ports (Hull) HRO 2006);
  - capital and maintenance dredging for the new quay and the additional lead-in berth;
  - in-dock Roll-on/ Roll-off (Ro/Ro) ramps for the unloading of wind turbine components;
  - refurbishment of the Eastern Lead-in Jetty;

- a 3 MW maximum operational, terrestrial generating wind turbine (125 m to tip height) to provide renewable energy to the local distribution network;
- a concrete helicopter landing site (HLS) and separate HLS facility; and
- associated infrastructure including, sprinkler tank, sub station(s), lighting, landscaping, car parking, flood defence works, internal roads for the movement of cargo and personnel, a holding area to enable in-bound vehicles to meet appropriate arrival slots and services and security fencing.

## Construction of GPH

2.13 Construction of GPH is anticipated to take approximately 28 months. For the purposes of the EIA, it is assumed that construction will start in 2012. The construction phase will create between 345 – 445 jobs.

2.14 Construction activities will include:

- the partial infilling of Alexandra Dock using dredged and other marine-sourced material;
- the construction of the consented reclaim area, by piling of the quay and infilling with dredged and other marine-sourced material;
- the dredging of the three berths;
- the construction of Ro/Ro ramps;
- the refurbishment of the eastern jetty leading into Alexandra Dock;
- the ground improvements; and
- the demolition of all buildings (excluding listed buildings and adjacent chimney) within the development site and construction of new buildings, internal roads, services (electricity, water, gas *etc.*) and surfaces;
- the construction of new buildings;
- the construction of internal roads;
- the construction of a concrete HLS;
- the provision of services (electricity, water, gas *etc.*); and
- site re-profiling and surfacing across the development site to form a suitable surface for wind turbine assembly and storage.

## Operation of GPH

2.15 Siemens has indicated that approximately 200 wind turbines will be produced per year when GPH opens, increasing to 300 per year, and with the proposed development having the

potential to 'flex' up to 500 per year to fulfil demand in the future. All the wind turbine components will be loaded on to large ships (known as Wind Installation Vessels (WIVs), see Picture A) at the quay edge before being shipped out to the offshore wind farm sites.



**Picture A: Example WIV (Sea Worker) (source: A2SEA)**

- 2.16 Figure C illustrates the main parts of a wind turbine. In summary the turbine is made up of:
- nacelle – the housing that contains the energy generating components of the wind turbine;
  - blades – the sails of the system, which are moved by the wind and transfer wind energy to the nacelle; and
  - tower – this supports the nacelle and blades and raises the wind turbine off the ground.
- 2.17 The factory on site will be used for the production of offshore wind turbine parts (mainly nacelles). Blade and tower components will arrive at the Port by ship. The majority of parts for the nacelles will arrive at site by road in containers, although some large components will be transported as an abnormal load (large or heavy loads).
- 2.18 The open areas of the proposed development site will be for the storage, handling, assembly and testing of wind turbines components, and, potentially the erection of wind turbines prior to shipping.
- 2.19 The quay will be approximately 640 m in length with two main berths (as per the consented Quay 2005 proposals) and an additional lead-in berth.
- 2.20 A 3 MW on-site operational wind turbine at the south-eastern part of the site will be erected to generate renewable energy to the local distribution network.
- 2.21 There will be a HLS to the east of Alexandra Dock lock entrance. Based on modelling undertaken by Siemens it is estimated that the HLS will be used approximately two to three times a week.
- 2.22 Although not likely to happen when GPH first opens, in due course a small proportion of wind turbines may be fully erected and examined on-site at the quayside (an almost imperceptible rotation of the blades) and then loaded in their fully erected form onto WIVs for onward

- shipment and installation (as a worst case, these fully erected wind turbines will be approximately 180 m to tip height).
- 2.23 Operation of GPH will be 24 hours per day, 7 days per week, as other current operations in the Port. The site will be suitably lit.
- 2.24 It is anticipated that GPH will employ approximately 700 – 800 staff in a variety of shift patterns. As indicated above, the production of wind turbines may 'flex' up to 500 turbines per year, in which case it is anticipated that staff numbers will increase accordingly, estimated at between 1,020 – 1,230 staff in a variety of shift patterns.

## The Need for GPH

### Government Position on Wind Power

- 2.25 The Government's targets for renewable energy are such that all sources of renewable energy must be explored to achieve the UK and European targets for emissions reductions and to ensure security of supply. By 2020, the UK Government targets require 15% of energy production to be from renewable sources (wind power, biomass, wave and tidal energy).
- 2.26 Wind power is an essential part of this low-carbon strategy, with the potential of off-shore power generation being recognised in the Government's 'Round 3' wind farm development zones announced by the Crown Estate in January 2010. In identifying the need to develop the supply chain, the Government has also indicated that it will provide up to £60 million in the period up to 2015 to assist in the development of wind manufacturing facilities at port sites in assisted areas in England, which illustrates the Government's continuing commitment to this element of the low carbon economy, through development proposals such as GPH.
- 2.27 The UK continental shelf in the North Sea in particular has great potential for wind generation, due to its relatively shallow waters and consistently strong winds. Recognising this, when in January 2010 the Crown Estate announced the Round 3 off-shore wind farm development zones, it identified three specific potential development areas in the North Sea, namely:
- Dogger Bank – with the potential to generate approximately 9 GW of renewable energy;
  - Hornsea – with the potential to generate approximately 4 GW of renewable energy; and
  - East Anglia – with the potential to generate 7.2 GW of energy.
- 2.28 To service all of the Round 3 development zones will require the construction of thousands of wind turbines, but the development of these sites is essential if the Government is to meet its target of delivering up to 25 GW from off-shore wind farms by 2020. It is anticipated that construction on Round 3 offshore wind farms will have to start in 2014 in order to meet the Government's legally binding obligations. To achieve this it will be necessary for port-based manufacturing and shipping facilities to be operational by 2014.

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## Siemens Preferred Port Location

- 2.29 Siemens identified a set of technical requirements that needed to be met to qualify as a potential port location (see Chapter 2 of ES). Five ports (including GPH) met these technical requirements.
- 2.30 Of those five ports GPH was chosen as the preferred location due to:
- existing consents;
  - existing infrastructure;
  - re-use of developed site ('brownfield' development);
  - ecological considerations;
  - ability to meet programme requirements; and
  - scale of the site available.

## Alternatives to GPH

- 2.31 A number of alternative options to the GPH proposal were considered and discounted because either they were assessed as likely to cause a greater environmental impact than the proposal selected or they did not meet Siemens technical requirements. The alternatives considered are discussed in detail below.

## Change the GPH Development to Reduce its Environmental Impact

- 2.32 An investigation was carried out to determine whether it would be possible to reduce the environmental impact of the proposed development by changing its design. This would involve the reconstruction of the lock entrance to Alexandra Dock so that WIVs could access the Dock (the lock entrance is 23.7 m wide and the new WIVs are typically 49 m wide), the deepening of berths within the Dock (they are currently too shallow) and the relocation of the existing dry dock and tank farm businesses. It was concluded that this option would cause its own additional environmental impacts as a result of the need to widen the approach channel to a new widened lock entrance, as well as requiring the complete closure of Alexandra Dock during construction of the new lock entrance. For these reasons this option was discounted.

## Construct GPH Elsewhere in the Port of Hull

- 2.33 Constructing GPH elsewhere in the Port would also require major reconstruction to the existing locks and widening of channels in the Estuary which would result in a greater loss of ecological designated habitat. In addition, insufficient land is available to meet Siemens technical requirements. As a result this option was also subsequently discounted.

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## Construct a Facility at Another Port Location

- 2.34 Proximity to any off-shore site is important in port selection in that it reduces the risk of delays to the supply of wind turbine components resulting from poor weather conditions whilst clearly offering the best option in terms of environmental sustainability. Ports in other parts of Europe with access to the North Sea have been discounted, mainly because they are too far from the Round 3 windfarm zones.
- 2.35 Over 40 UK ports have been considered by Siemens against the technical requirements set out above in the Siemens Preferred Port Location section, which built upon Crown Estate published criteria. The analysis is set out in detail in Chapter 2 of the ES. Five port locations (including GPH) met all the technical requirements, but the other four have been discounted, essentially for environmental and/ or operational reasons.

## Do Nothing

- 2.36 Doing nothing was not considered a practicable or sensible solution if the Round 3 wind farm zones are to become operational within the timescales set out by the Government.

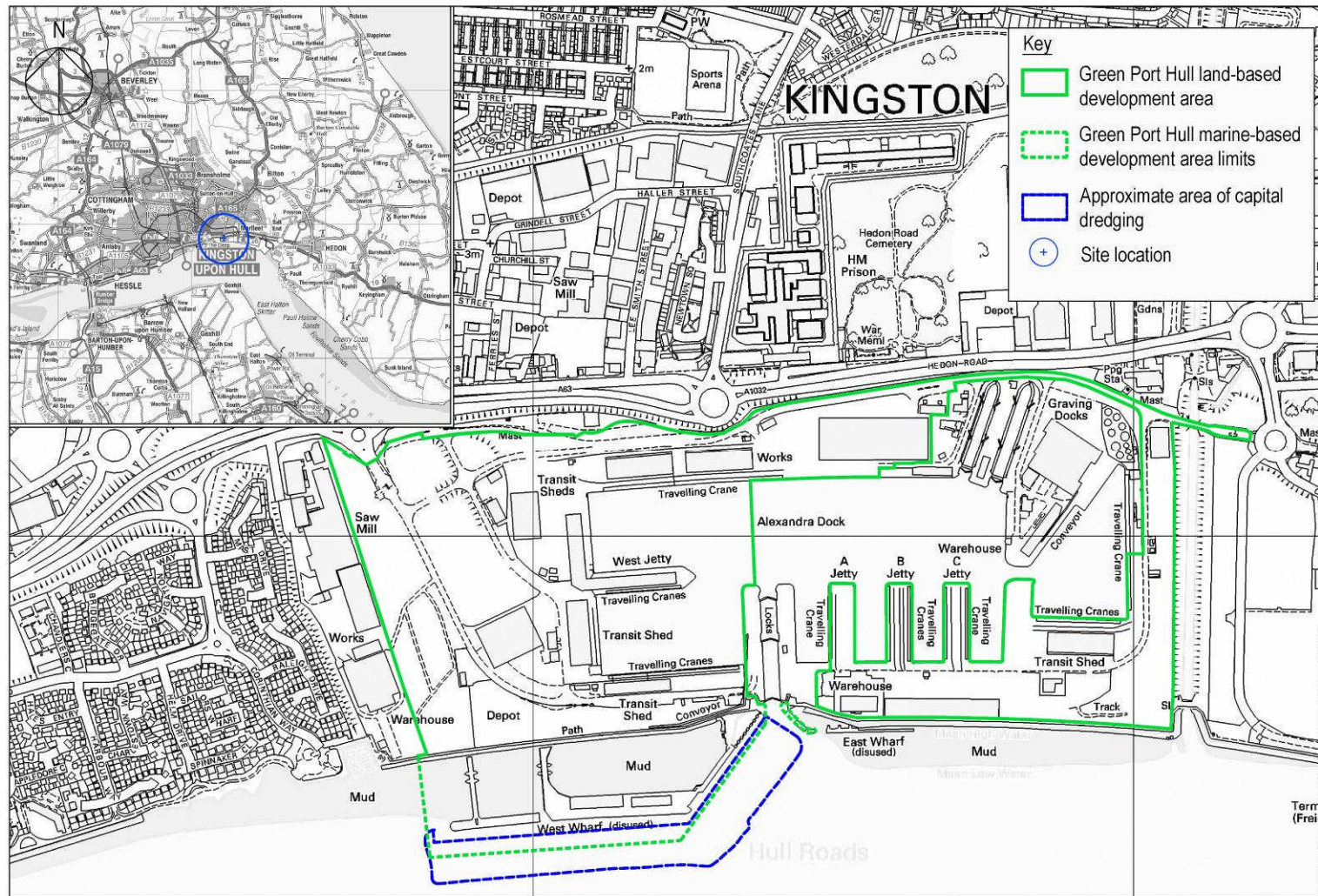
## Optimised Design

- 2.37 The selection of Alexandra Dock by Siemens demonstrates that this site represents the best option for Siemens not only in terms of ease of deliverability, but also when considering the management of its future cost base.
- 2.38 Siemens, are a world renowned presence in the off-shore wind market and, at a world wide level, have installed around 8,700 turbines, representing a capacity of more than 11,000 MW – of which about 1,080 MW is in the off-shore sector. Siemens has applied its wealth of expertise to this project from an early stage, a factor that has enabled the project to be designed and optimised to a high level of detail resulting in, ultimately, a high degree of confidence in its viability.

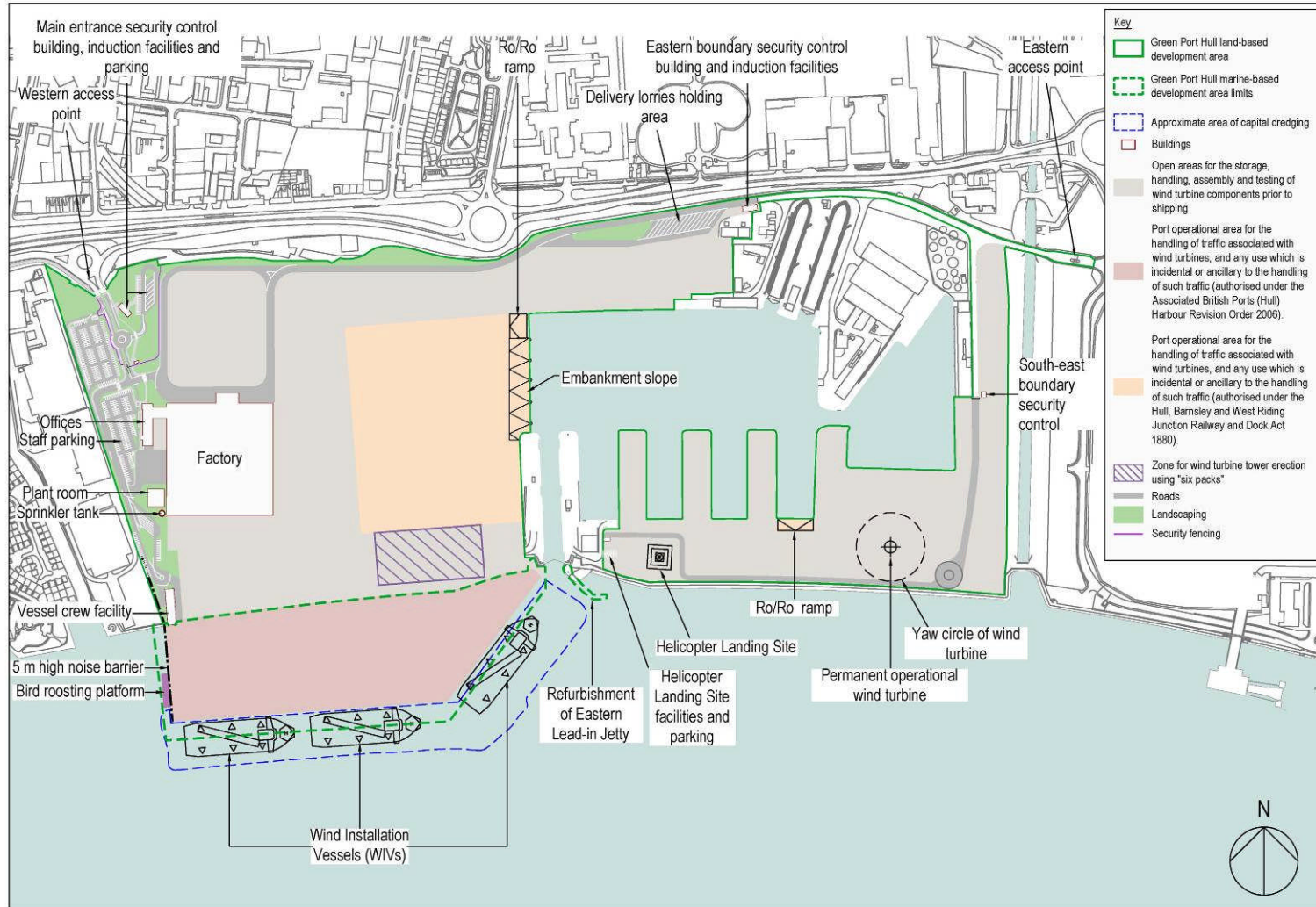
## Cost of Climate Change

- 2.39 Meeting the UK's renewable energy targets will not be without challenge, and has a clear cost. As Lord Stern indicated, however, in the 2007 review of the economics of climate change (HM Treasury, 2007) the costs of not doing anything are much higher. The benefits of promoting renewables as a viable and cost-effective way of generating electricity do not, however, stop there; there are in fact very clear environmental, economic and employment benefits attached to this growing sector, and GPH has a crucial part to play in this overall picture – *"The investment that takes place in the next 10-20 years (to avoid the worst effects of climate change) will have a profound effect on the climate in the second half of this century and the next."* (HM Treasury, 2007).

**Figure A: Site location plan**



**Figure B: Proposed development layout** (the yaw circle is the area swept by the wind turbine blades.)

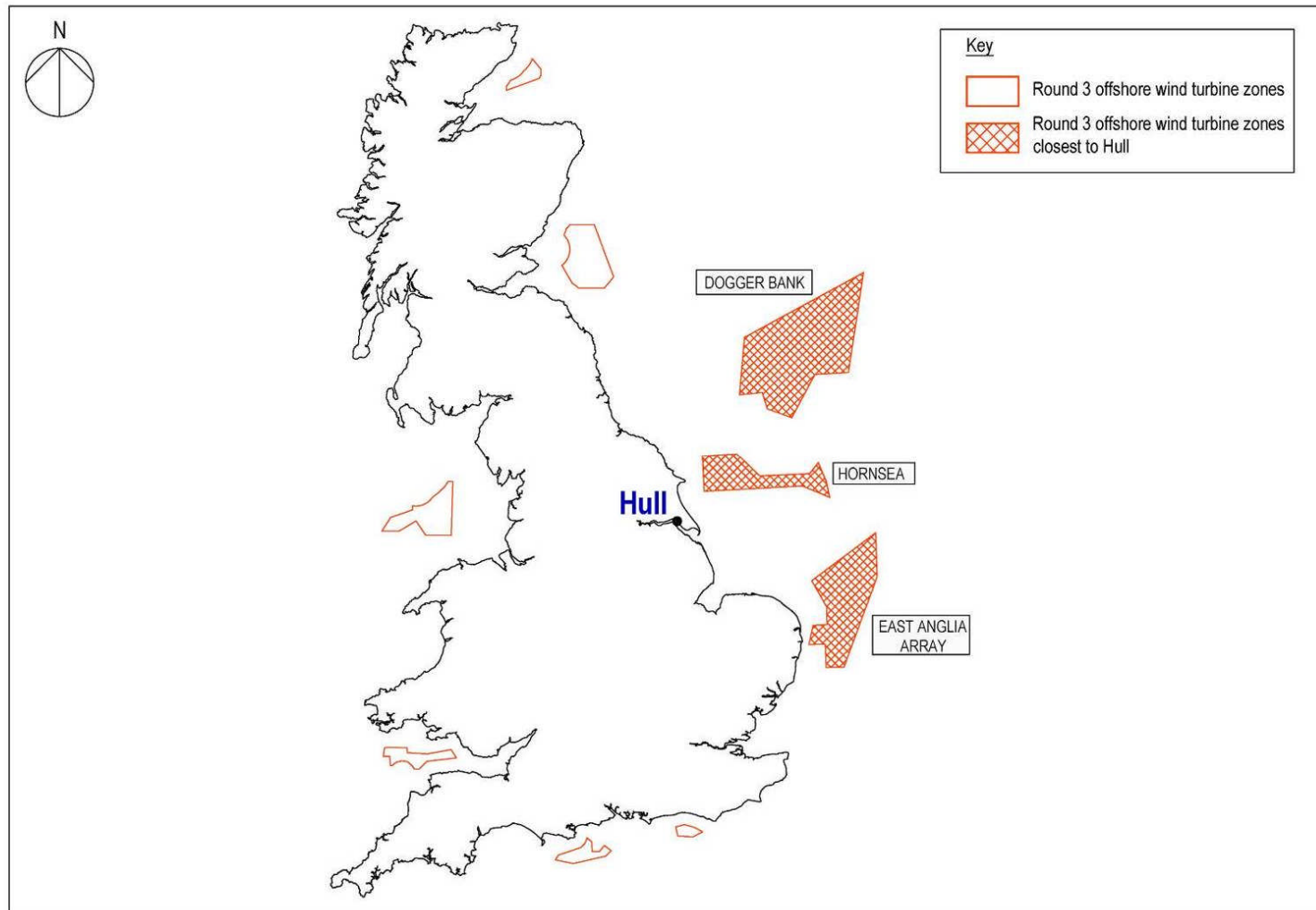




**Figure C: Main wind turbine components**



**Figure D: Round 3 offshore wind farms closest to the proposed development site**



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## 3 Planning Policy

3.1 The proposed development is located in the local authority area of Kingston Upon Hull City Council.

3.2 The proposed development has been considered in terms of its fit with national, regional and local planning policy guidance. In particular the assessment has focussed on economic development aims, land-use policy, freight and transport policies. The policy documents reviewed as part of this study include:

- The UK Low Carbon Transition Plan: National Strategy for Climate and Energy (Department for Energy and Climate Change, 2009);
- Transport White Paper - Creating Growth, Cutting Carbon: Making Sustainable Transport Happen (Department for Transport (DfT), 2011);
- Energy White Paper: Meeting the Energy Challenge (Department for Trade and Industry, 2007);
- Modern Ports: A UK Policy (DfT, 2000);
- National Policy Statement for Ports (DfT, 2011);
- UK Marine Policy Statement (HM Government, 2011);
- National Planning Policy Guidance notes and Planning Policy Statements;
- Draft National Planning Policy Framework (Department of Communities and Local Government (DCLG, 2011));
- Regional Economic Strategy (Yorkshire Forward, 2006);
- The Yorkshire and Humber Plan - Regional Spatial Strategy to 2026 (Yorkshire and Humber Assembly, 2008);
- Joint Structure Plan for Kingston upon Hull and the East Riding of Yorkshire (Kingston upon Hull and East Riding of Yorkshire Councils, 2005);
- Kingston upon Hull Local Plan (Hull City Council, 2000); and
- Hull Core Strategy Publication Version (Hull City Council, 2011).

3.3 The Port of Hull is an economic priority at all levels of planning policy (national, regional and local). At a national level, the importance of developing ports to maintain their capacity and ensure they remain competitive is clearly recognised, with specific encouragement given to 'sustainable port projects'. The proposed development will contribute to many national and regional planning objectives and policies, including those relating to economic development, the development of ports and the promotion of renewable energy.

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- 3.4 Locally the site is located within a Regeneration Priority Area and Strategic Employment Area, with one of the key strategic objectives of the City of Hull being 'to promote the Port'. It is designated as an existing area of employment where appropriate development will be encouraged. The Hull Local Plan supports both the existing dock and the consented 7.5 ha reclamation area for port uses. Policies in the emerging Hull Core Strategy are also supportive of this proposed development.
- 3.5 In August 2011 the application area was granted Enterprise Zone Status to drive forward the city's economic ambitions particularly with regard to opportunities for growth around renewable energy, ports and innovation. Enterprise Zones are intended to attract investment by providing benefits such as reduced taxation on businesses. Hull City Council is seeking a Local Development Order for the Enterprise Zone which would provide a simplified route to gaining planning consent for the renewable energy sector.

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## 4 Socio-Economics

4.1 The effects of the proposed development on the local and regional economy and employment levels have been considered.

4.2 Information has been gathered from published national, regional and local statistics and strategies. These include:

- Office for National Statistics;
- National energy policy and statistics; and
- The Yorkshire and Humber Regional Economic Strategy.

### Existing Conditions

4.3 Hull is one of the most deprived Local Authority Districts in England, as demonstrated in the following key statistics:

- in the twelve months ending in June 2010 unemployment in Hull was 14.1%, the highest unemployment rate in Great Britain, compared to 7.7% average unemployment of Great Britain as a whole;
- in Hull 7.6% of the working population were claiming job seekers allowance, compared to 3.7% for Great Britain as a whole;
- Gross weekly pay in 2010 for full time workers resident in Hull, at £399.10 was 21.5% less than for Great Britain as a whole, at £508.80; and
- the latest indices ranks Hull as the 5th most deprived local authority district in England, out of 326 local authorities.

4.4 Currently there are ten businesses located at the proposed development site, employing approximately 200 staff.

### Construction of GPH

4.5 The construction of GPH will directly create between 345 – 445 jobs, this is assessed to be a significant beneficial effect.

4.6 ABP will assist seven of the ten businesses within the proposed development site who together employ around 120 staff, to relocate to new locations within the Port of Hull. Improved facilities at the new locations within the Port of Hull may lead to an increase in job opportunities associated with these businesses. Two of the ten businesses, employing around 70 people, will relocate outside the Port but will still remain in East Hull. One business, employing less than ten employees, will leave Hull. Overall this effect is considered to be neither significantly beneficial nor adverse.

## Operation of GPH

- 4.7 It is anticipated that initially GPH will employ approximately 700 – 800 staff, but as the production of wind turbines increases, the number of staff will also increase to approximately 1,020 – 1,230. As the proposed development will lead to increased spending in the area, a large number of jobs and opportunities will also be created indirectly through the provision of supplies and services to the development and its workforce. This will provide opportunities for the local and sub-regional labour force. Overall employment effects are considered to be significantly beneficial.
- 4.8 Siemens is committed to the training and development of its staff. In addition to training to be provided to employees when the proposed development is operational, Hull City Council is working in partnership with Job Centre Plus and Hull College to develop a training and skills package to raise relevant skills levels within Hull and the East Riding of Yorkshire in readiness for the potential job opportunities in the renewable energy sector.

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## 5 Land Uses and Recreational Activities

- 5.1 Land uses in and around the site have been identified and the potential effects of the proposed development on these uses have been assessed.

### Existing Conditions

- 5.2 Land uses within 2 km of the GPH site are shown in Figure E. The site is set within the existing port and is surrounded by industrial and commercial land uses to the north, east and immediate west beyond which is a residential area, known as Victoria Dock Village.
- 5.3 There are currently ten companies operating within the proposed development site.
- 5.4 One footpath exists within the proposed development site, although it is intended that this footpath will have been diverted prior to the commencement of construction works for the GPH development.
- 5.5 Some recreational angling takes place along the waterfront adjacent to Alexandra Dock.

### Construction of GPH

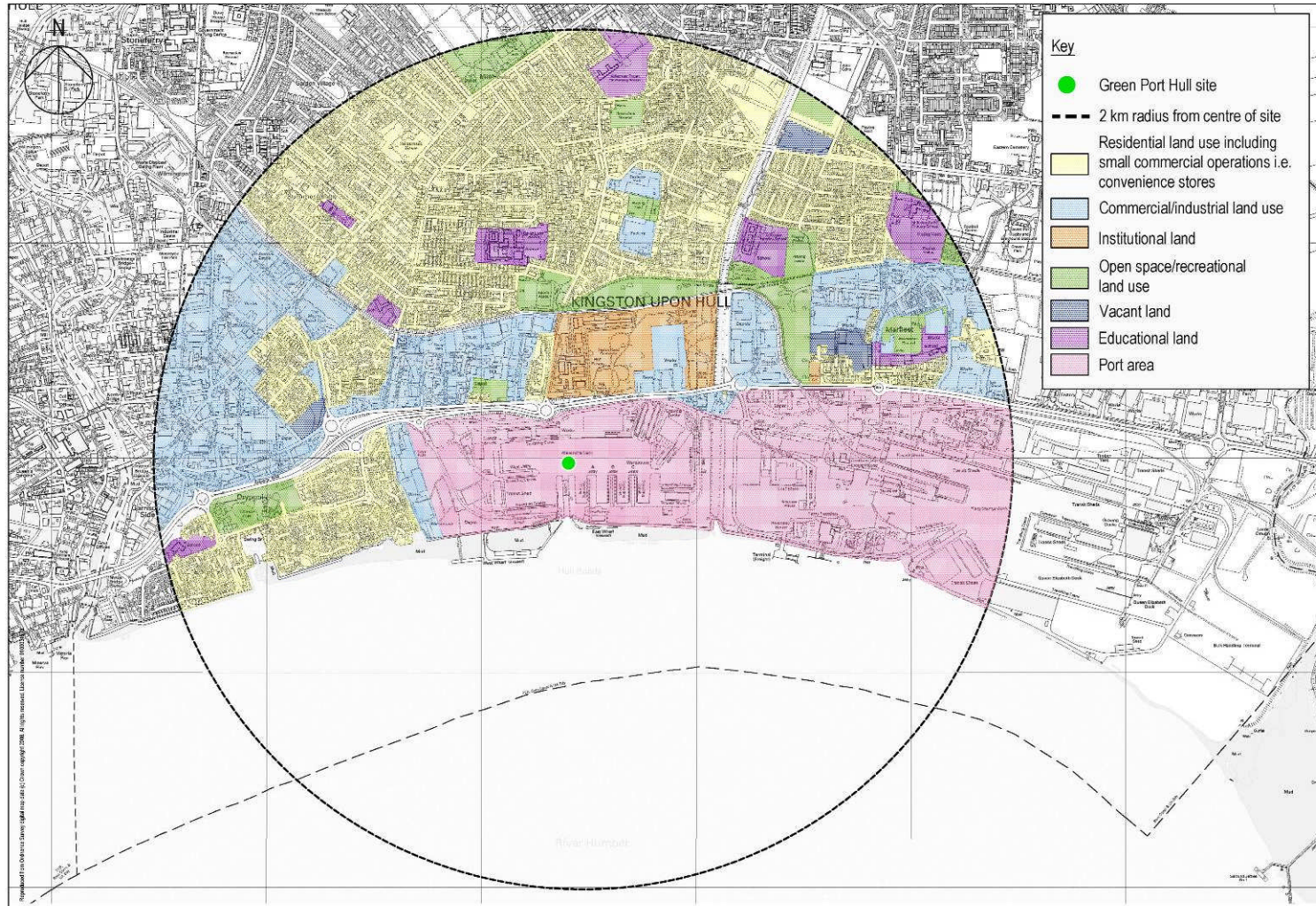
- 5.6 Existing tenants and occupiers of the proposed development site will be moved as a result of the proposed development (see Socio-Economics).
- 5.7 Provided the footpath is diverted prior to construction, the GPH development will not directly impact on the line of the diverted path, which will include a new permissive cycle route. The diverted footpath will contain seating, viewing areas and information boards. Users of the footpath will benefit being able to see the operating processes taking place at the site which is considered to be of considerable local interest. This is assessed to be a minor beneficial effect on footpath users.
- 5.8 If the Secretary of State does not confirm the proposed diversion, however, then it will still be necessary for the footpath to be diverted, using an alternative statutory mechanism, in that if it were to remain on its current line, it would bisect the proposed GPH operational site. This would create an unacceptable risk in terms of health and safety to members of the public using the path as well as creating an unacceptable operational constraint for the GPH development.
- 5.9 Whilst recreational angling will no longer be possible along the diverted section of the footpath, other more accessible locations (adjacent to car parks) will still be available in the local area, e.g. at the southern end of Northern Gateway.
- 5.10 No significant adverse effects on land uses and recreational activities have been identified.

## Operation of GPH

- 5.11 No effects on land uses and recreational activities beyond those detailed above for the construction phase have been identified as a result of the operation of the proposed development.
  
- 5.12 Other potential effects on nearby land uses and occupiers are considered in later sections of this NTS, including noise (summary in section 7 of this NTS), air quality and dust (summary in section 8 of this NTS).



**Figure E: Land uses within 2 km of the proposed development site**



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## 6 Traffic and Transportation

- 6.1 The effects of construction and operation of the proposed development on traffic and transport have been considered by JMP Consultants Limited in consultation with the Highways Agency and Hull City Council. A separate Transport Assessment and a complementary Travel Plan have also been prepared by JMP Consultants Limited.
- 6.2 Existing conditions at the site have been established through data collection, surveys and the review of published information. The future growth in background traffic (traffic currently on or predicted to be on the road network that is not related to GPH) has been estimated using standard growth factors. Traffic flows during construction and operation have been calculated using information provided by Siemens and ABP.

### Existing Conditions

- 6.3 There are two existing access points to Alexandra Dock; the western access via the A1033 Mount Pleasant roundabout and the eastern access off the roundabout at the northern end of Northern Gateway. The western access is currently temporarily gated and unused and the eastern access has an existing security gate to control access to the Dock (see Figure F).
- 6.4 There are a number of bus services operating at various points along Hedon Road in the vicinity of GPH (approximately a 10 to 23 minute walk), as well as services on Mast Drive in the adjacent Victoria Dock Village (approximately a 6 minute walk).
- 6.5 Walking and cycling routes to the site are generally good. There are footways leading to both the proposed western and eastern entrances to GPH and around the junctions of the A1033/A63 Castle Street.

### Construction of GPH

- 6.6 The traffic generated as a result of construction of the proposed development will be variable depending on site activity. The maximum number of traffic movements in and out of the site for each month of construction have been predicted. The peak of construction is anticipated to be towards the end of 2013 when the fitting-out of the buildings is envisaged, at this time the daily construction journeys to and from the site in total per day are anticipated to be 806 movements (made up of 602 light vehicles and 204 heavy vehicles).
- 6.7 The change in traffic at the peak of construction activity is well within the typical daily traffic variation and therefore the increase will not be noticeable by those potentially affected groups and interests along A63 Castle Street (along which most traffic is predicted to arrive and leave). The effects of construction traffic on key links of the Strategic Road Network (SRN) at the peak of construction are:
- a daily (Annual Average Daily Traffic (AADT)) increase no greater than 1.4%;
  - a AM Peak increase no greater than 2.4%; and
  - a PM Peak increase no greater than 2.2%.

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6.8 No significant adverse effects are therefore identified.

## Operation of GPH

6.9 The traffic generated as a result of the operation of the proposed development has been assessed based on range of shift patterns for employees (see Chapter 6 of the ES for further details).

6.10 During operation it is anticipated that there will be 1,626 traffic journeys to and from the site in total per day as a result of GPH (made up of 1,566 light vehicles and 60 heavy vehicles).

6.11 The change in traffic caused by the operation of GPH is well within the typical daily variation in traffic and will not be noticeable along A63 Castle Street. Based on shift patterns indicated by Siemens, the effects of operational traffic on key links of the Strategic Road Network (SRN) are:

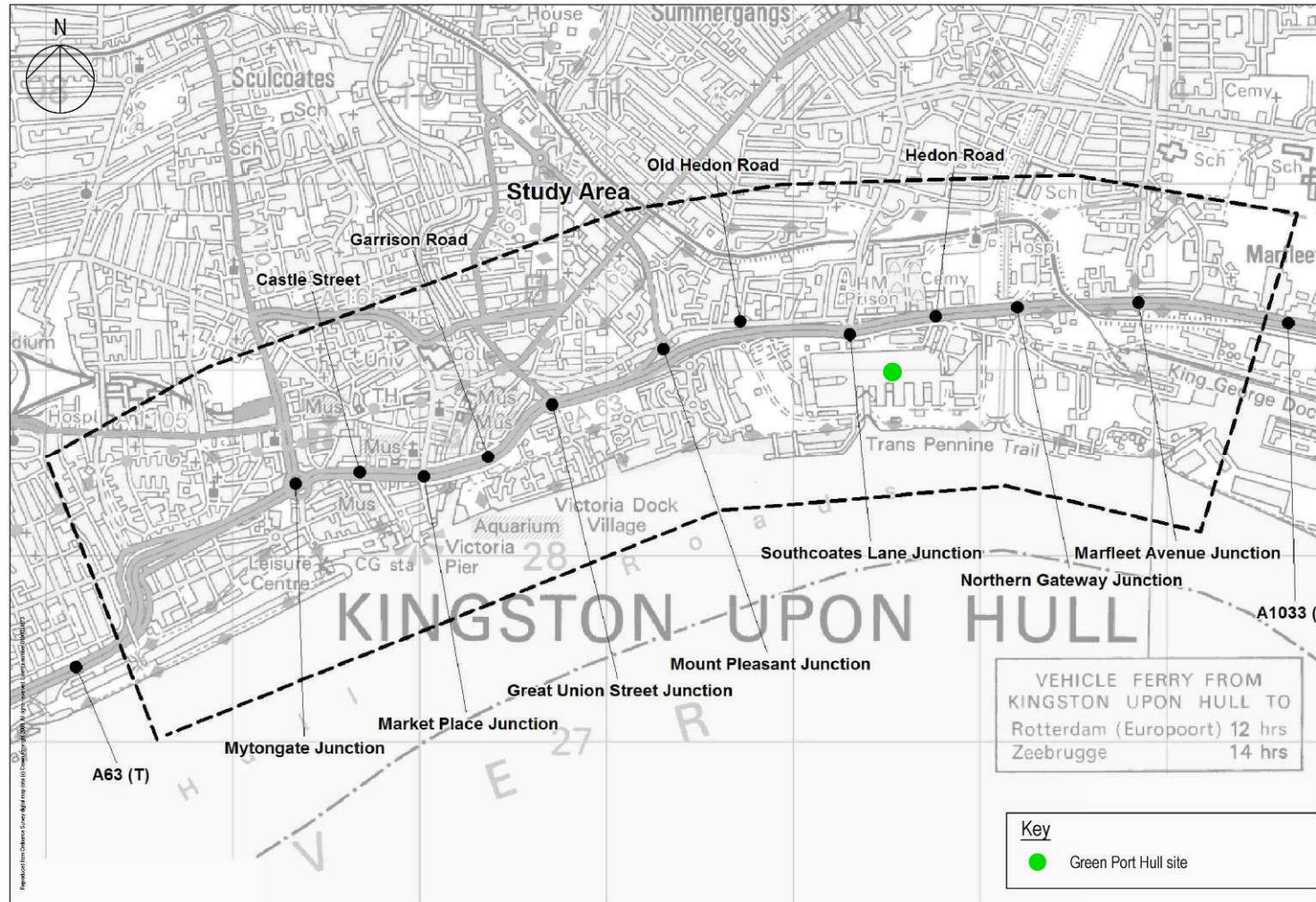
- a daily (AADT) increase no greater than 1.4%;
- a AM Peak increase no greater than 5.0%; and
- a PM Peak increase no greater than 2.5%.

6.12 No significant adverse effects are therefore identified. A sensitivity test assuming potentially alternative shift patterns has also been undertaken in relation to certain staff. The findings of this test also conclude that there are no significant traffic and transportation effects arising from the operation of GPH.

6.13 Possible routes for abnormal loads are considered in the Transport Assessment which accompanies this application.

6.14 A Travel Plan has been prepared for GPH. Over time, the Travel Plan will encourage an increasing proportion of employees at GPH to travel to work by sustainable modes of transport and/ or to increase the proportion of car share by those who do not have access to sustainable public transport services.

**Figure F: Traffic and transportation study area**



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## 7 Noise and Vibration

- 7.1 The potential noise and vibration impacts associated with the construction and operation of the proposed development have been assessed by Bureau Veritas. Both daytime and night-time construction and operational noise impacts (including the on-site wind turbine and helicopter movements) have been predicted at representative residential properties ('receptors') closest to the site.
- 7.2 Consideration of noise impacts is based on a comparison of predicted and existing noise levels with reference to noise standards, to determine the significance of effects. Noise modelling software has been used to predict operational noise levels (presented as maps– see Figure G for an example) at receptor locations.

### Existing Conditions

- 7.3 Noise monitoring was carried out within and around the proposed development, in order to understand the existing noise conditions. Noise is currently generated from the existing port operations, general environmental conditions such as wind and waves, and road traffic on Hedon Road.

### Construction of GPH

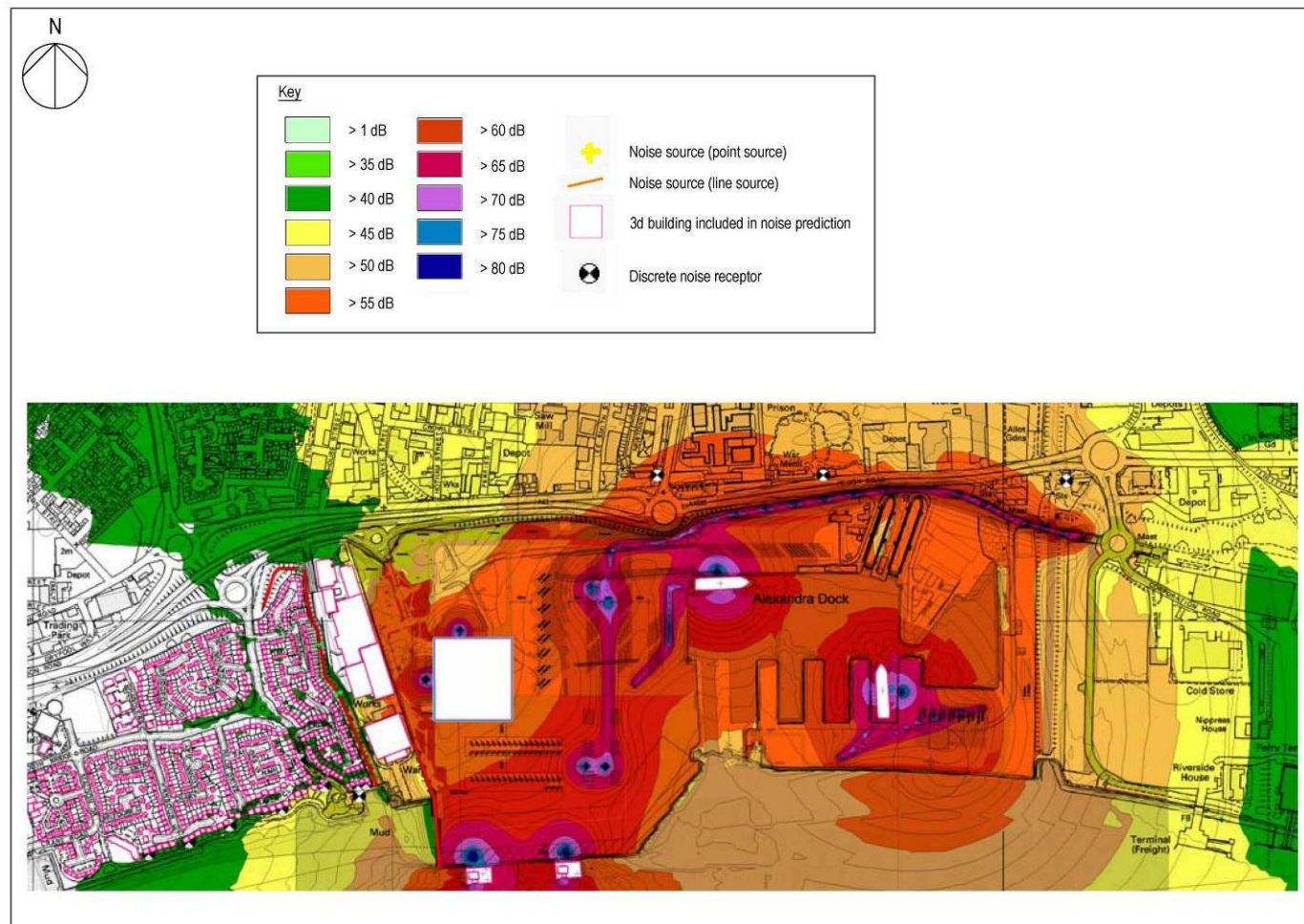
- 7.4 The greatest noise impact during construction will occur when piling the quay walls of the marine facility. Piles will be struck by a pile hammer (this is known as percussive piling) which has the potential to cause annoyance to the closest residential receptors. To minimise any possible disturbance percussive piling will only take place 08:00 to 18:00 Mondays to Fridays, except if it would constitute a health and safety risk to leave a pile in a partly driven position. It is expected that each pile will be percussively driven for approximately 30 minutes (subject to local ground conditions). Typically it is only possible to install about two or three of these piles, on average each day, giving an indicative 12 month piling period.
- 7.5 The construction of the quay wall is anticipated to be one of the first construction activities to take place and it is proposed that it will commence at the south-western corner of the quay, closest to Victoria Dock Village. This is assessed to result in a significant adverse effect at some of these residential properties for part of the construction period. Thereafter, piling will continue in a west to east direction, away from Victoria Dock Village. Noise levels will be monitored in a scheme agreed with Hull City Council and noise screening will be employed if appropriate.
- 7.6 Night-time dredging will take place, but this will not be close to houses so no significant adverse night-time noise effects are predicted during construction.
- 7.7 The potential effects of construction noise on birds are discussed in summary in section 11 of this NTS (Ornithology) and on fish and marine mammals in summary in section 12 of this NTS (Marine Ecology and Nature Conservation).
- 7.8 For a short time during construction of the quay walls, there may be a significant adverse vibration effect which could cause some temporary annoyance/ disturbance to local residents,

for part of the construction period, but is significantly below the threshold where building might be expected. Nevertheless, structural surveys, before and after these works, will be offered to householders potentially affected by construction induced vibration, with remedial works undertaken as appropriate. Vibration levels will also be monitored in a scheme agreed with Hull City Council.

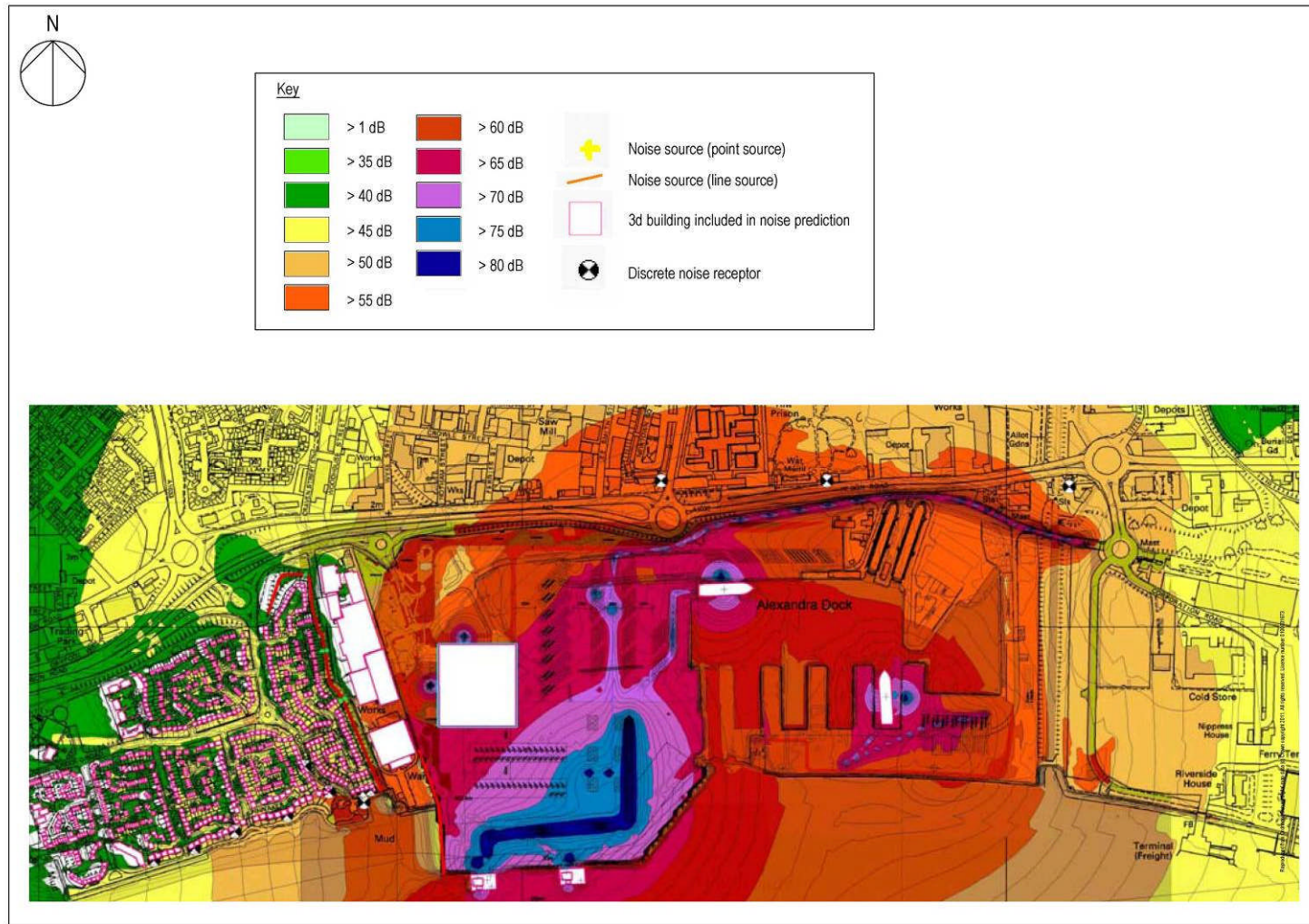
## Operation of GPH

- 7.9 During operation and in the longer term the noise effects are considered to be less likely to cause disturbance in comparison to those identified during construction. Figure G shows the daytime noise contour during the operational phase of GPH without the activity of assembling towers taking place. Figure H shows the daytime noise contour during the operational phase of GPH, including the activity of assembling towers. Figure H shows the worst-case scenario, but is expected to occur less frequently than the scenario shown in Figure G.
- 7.10 Some higher than average noise levels will occur during the daytime when tower sections of the wind turbines are being assembled although this will not occur every day. Higher than average noise levels will also occur occasionally when completed tower sections are transported to the marine facility for loading onto WIVs, although a 5 m noise barrier to be built along the western edge of the reclaim will mitigate this effect.
- 7.11 At night, some limited noise impact will occur when loading WIVs under certain weather conditions (night-time loading operations are required because WIVs will arrive and leave the quay during high tide, which may occur at night-time).
- 7.12 To ensure that minimum disturbance occurs to local residents, particularly at night, a noise mitigation scheme will be developed with Hull City Council. As a result, no significant adverse noise effect is predicted at the closest residential receptors i.e. those at Victoria Dock Village.
- 7.13 No significant adverse effect at receptors is predicted as a result of road traffic noise, the use of a helicopter or the operation of the on-site wind turbine.
- 7.14 The potential effects of operational noise on birds are discussed in summary in section 11 (Ornithology) of this NTS and on fish in summary in section 12 (Marine Mammals) of this NTS.
- 7.15 No significant adverse levels of operational vibration are anticipated.

**Figure G: Noise model map showing predicted  $L_{Aeq}$  1 hour daytime noise levels during operation (excluding tower assembly)**



**Figure H: Noise model map showing predicted  $L_{Aeq}$  1 hour daytime noise levels during operation (including tower assembly)**





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## 8 Air Quality and Dust

- 8.1 The assessment has considered the impact on air quality arising from the construction and operation of the proposed development. The air quality assessment is based on best practice and guidance, and predicted changes to concentrations of two pollutants (nitrogen dioxide (NO<sub>2</sub>) and airborne particles of material less than 10 micrometers in diameter (PM<sub>10</sub>)) from vehicle exhausts at sensitive locations near to the site (e.g. residential properties).

### Existing Conditions

- 8.2 A four month survey of NO<sub>2</sub> at eight locations was undertaken to understand existing concentrations adjacent to the local road network in the vicinity of the site. These results, together with data from the Hull City Council's own air quality monitoring stations, demonstrate the levels of air pollutants surrounding the site are generally of a good standard. Hull City Council has, however, identified an area around the A63 Castle Street where NO<sub>2</sub> concentrations are in excess of the air quality objectives at some locations. Consequently, it has declared an Air Quality Management Area for this pollutant.

### Construction of GPH

- 8.3 The construction of the proposed development could give rise to emissions of dust. Standard dust control measures for construction sites, such as the use of water sprays in dry conditions, will be used on site to reduce dust emissions during the construction phase, and no significant adverse effect is predicted at any ecological, commercial or residential receptor.
- 8.4 During the construction of the proposed development, annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations from construction traffic are predicted to be very small (less than 0.4 µg/m<sup>3</sup> (one - millionth of a gram)) with no significant adverse effect on sensitive receptors. Pollutant concentrations would remain well below the limits set by air quality objectives at residential properties close to A1033 and at Victoria Dock Village.

### Operation of GPH

- 8.5 An assessment of the potential impacts associated with emissions to air from the site in the operational phase has been scoped out of the assessment because the proposed factory will not release large quantities of air emissions and the surfacing on the site will not release large quantities of dust.
- 8.6 No significant adverse effects on local air quality are predicted during the operation of GPH due to operational traffic movements. Annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations from operational traffic are also predicted to be very small (less than 0.4 µg/m<sup>3</sup>) with no significant adverse effect on sensitive receptors. Air quality standards in and around the area of the proposed development site will continue to be achieved.

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## 9 Coastal and Estuarine Processes

- 9.1 The effects of the proposed development on the Humber Estuary system including water levels, water flow speeds and sediment movements, have been assessed by ABPmer using computer modelling.
- 9.2 Previous computer modelling, carried out in support of the consented Quay 2005 development, has been revisited to assess the impacts of the proposed GPH marine facility. The conclusions of the coastal and estuarine processes assessment for both construction and operation of GPH are generally the same as for Quay 2005.

### Existing Conditions

- 9.3 The Humber Estuary is a highly variable system, and any effects caused by the proposed development are considered within this context.

### Construction of GPH

- 9.4 The proposed development includes the reclamation of 7.5 ha of land in the Estuary for the construction of a new quay (consented as Quay 2005) and three dredged berths that will result in the loss of 4.5 ha of intertidal mudflat (mud that is currently covered by water at high tide and exposed at low tide) and up to 3 ha of subtidal area (underwater estuary bed). Approximately 5.2 ha of subtidal area will also be temporarily affected during the dredging operation.
- 9.5 The material produced by the dredging of the two consented berths will be used to create the reclamation area. The material produced by the dredging of the lead-in berth and widening of the two consented berths will be deposited elsewhere in the Humber Estuary under a licence. Additional material (sourced from the marine environment) will be brought to the site by ships to provide the remainder of the material required for the reclamation and for the partial infill of Alexandra Dock.
- 9.6 During dredging, disposal and piling works, the disturbance of fine sediments will be limited and is unlikely to be detectable within the highly variable background suspended sediment concentrations in the Estuary, and will therefore not cause significant settlement on the bed. This is not assessed as being of a significant adverse effect.
- 9.7 Any changes to the speed of water movements in the Estuary resulting from the proposed development will be very small, remaining local to the site and are not considered to result in a significant adverse effect.

### Operation of GPH

- 9.8 The operation of GPH will not significantly change the overall amount of on-going dredging (known as maintenance dredging) required to maintain channels and berths within the Estuary. Small additional amounts of maintenance dredging required at new marine berths will be offset by reductions in maintenance dredging required within Alexandra Dock. There will be no additional effects arising from the placement of dredged material in the Estuary.

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- 9.9 Any changes to the speed of water flow in the Estuary resulting from the proposed development will be very small and will remain local to the site. Small eddies (circulating water) will be created at both ends of the reclamation area, requiring some additional maintenance dredging of the approaches to Alexandra Dock.
- 9.10 Considering all effects on the coastal and estuarine processes, the impact of the operation of GPH on the Estuary as a whole will not result in a significant adverse effect in the short or long-term, with all effects occurring close to the marine facility at GPH.

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## 10 Water Quality, Drainage and Flood Risk

- 10.1 The effects of the proposed development on surface water and groundwater quality and on drainage have been assessed. In order to comply with regulatory requirements, a separate Flood Risk Assessment has also been prepared.

### Existing Conditions

- 10.2 The surface water, groundwater and drainage conditions at the site were determined by a desk-based study. The main surface water features surrounding the site are the Holderness Drain and the Humber Estuary (see Figure I).
- 10.3 Surface water runoff from the majority of the proposed development site currently drains to various outfalls around Alexandra Dock, draining directly into the Lock complex and also directly to the Humber Estuary.
- 10.4 Flood zone maps produced by the Environment Agency show that the site is located in Flood Zone 3a, meaning that the site is considered to have a high risk of flooding. The site is currently protected from flooding by a flood defence wall approximately 1.5 m high located along the bank of the Humber Estuary.

### Construction of GPH

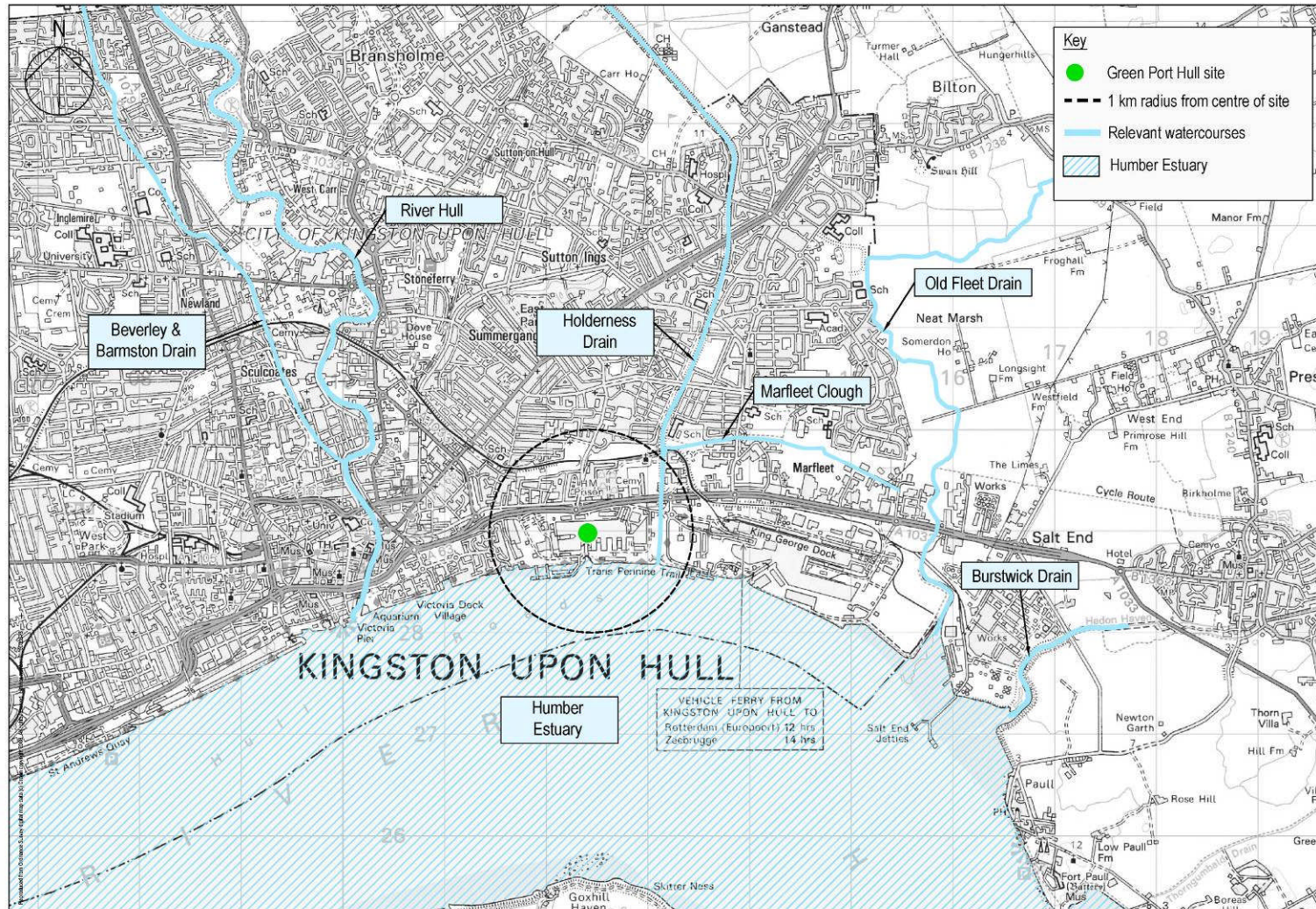
- 10.5 Potential impacts during construction include pollution of surface water, disturbance of contaminated sediments in the Estuary, transport of sediments off the site in runoff; and pollution from sewage. Measures, including suitable storage of materials on site and spillage prevention, will be carried out to minimise risks to water.
- 10.6 There is potential for significant adverse effects to result from the possible accidental leakage/spillage of pollutants, contaminated runoff entering a waterbody, or sediments transported in site runoff but the likelihood of these impacts occurring is low due to the drainage and site management systems that will be in place.
- 10.7 A new flood defence wall approximately 6.8 m Ordnance Datum Newlyn (ODN) around the perimeter of the site will increase the level of flood protection to that provided by the existing flood defence wall.

### Operation of GPH

- 10.8 Significant adverse effects are possible if there was an accidental leakage/spillage of pollution or disturbed sediments were released into the Humber Estuary. The likelihood of these impacts occurring, however, is low due to the drainage and site management systems that will be in place.
- 10.9 A large area of the proposed development site will be covered in gravel which will allow rainfall to pass through into the ground. This is considered to be a significant beneficial effect because it reduces the risk of flooding and, together with the increased height of the new flood defence

wall, will protect the site from flooding from Estuary over-topping. It will also help to reduce the effects of sea level rise arising from climate change.

**Figure I: Waterbodies close to the proposed development site**



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## 11 Ornithology

- 11.1 This chapter considers the potential impacts of the proposed development on waterbirds within the Estuary, specifically those waterbirds which use areas covered by water at high tide and which are exposed at low tide (intertidal habitats). Other relevant ecology issues are assessed in summary in section 12 (Marine Ecology and Nature Conservation) of this NTS.
- 11.2 A desk based study and field surveys have been undertaken to identify important features including sites designated for their importance to nature conservation and protected species. Bird surveys have been undertaken every year at Alexandra Docks mudflats between August and May since 2003. All eight years of survey data have been used in the assessment, which due to its length of time increases the confidence in the conclusions drawn. Discussions with relevant nature conservation organisations have taken place to find out where legally protected areas and species occur near to GPH.

### Existing Conditions

- 11.3 Part of the proposed development site (the consented reclamation area) is located within a number of protected nature conservation designations (see Figure J); specifically the Humber Estuary Special Area of Conservation (SAC); Special Protection Area (SPA); Ramsar site; and Site of Special Scientific Interest (SSSI). The Estuary as a whole is an important habitat for migratory and wintering waterbirds and this is recognised through its listing as an Important Bird Area (IBA). The proposed development site does not, however, lie within the boundary of the IBA.
- 11.4 The Alexandra Dock mudflats are of relatively low value for bird feeding compared to other intertidal areas within the Estuary, because they are small (less than 24 ha is uncovered at low tide) and do not support large numbers of invertebrates for birds to feed on. Consequently the Alexandra Dock mudflats do not support large numbers of foraging waterbirds.
- 11.5 The partially disused West Jetty structure at Alexandra Dock is used as a temporary roost site by birds at high tide when mudflat feeding areas are covered by the tide.
- 11.6 The Humber Estuary and Alexandra Dock is well used by a number of ships and is considered to be a relatively noisy environment. There were around 29,500 commercial shipping movements in the Humber Estuary in 2010.

### Construction of GPH

- 11.7 There will be a loss of 4.5 ha of intertidal mudflat habitat that waterbirds use for feeding as a result of the construction of GPH. This is assessed to result in a significant adverse effect because the habitat is of international importance to waterbirds.
- 11.8 The West Jetty, which falls within the area to be reclaimed for the new quay, will be lost, but it is proposed that a temporary roosting area is provided during construction, with a new permanent artificial roosting platform to be created at Alexandra Dock to provide replacement habitat for waterbirds at high tide. This will be in addition to the rock armour (covering the embankment) already in place at Queen Elizabeth Dock that provides alternative high tide

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habitat for birds, and which formed part of the mitigation strategy for the consented Quay 2005 development. There will, therefore, be no significant effects on birds in the Humber Estuary SAC/SPA/Ramsar at high tide.

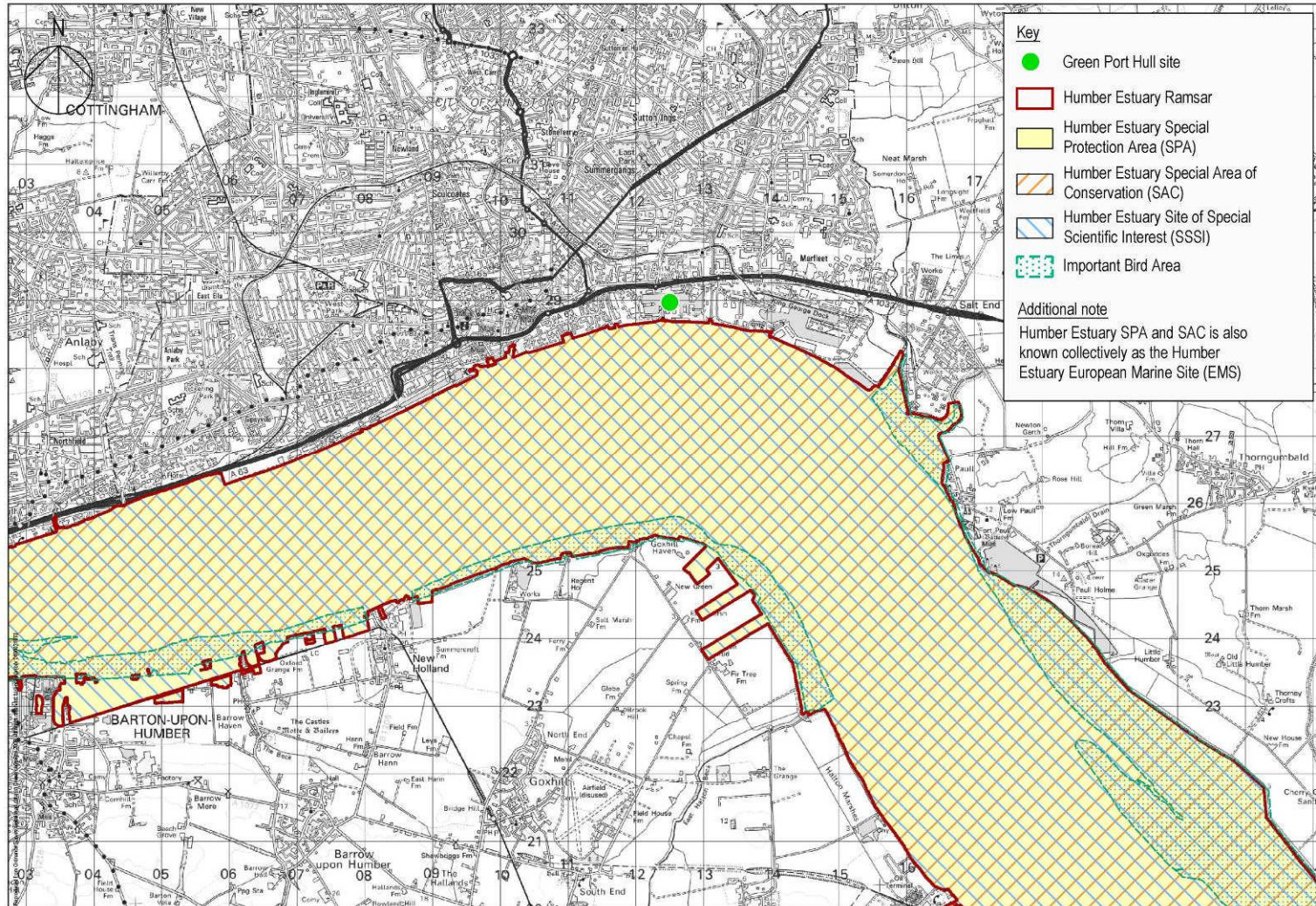
- 11.9 Noise and visual disturbance due to the construction of GPH is not assessed to result in any significant adverse effects on waterbirds feeding on the mudflats retained at Alexandra Dock.

## Operation of GPH

- 11.10 The use of the HLS may cause temporary disturbance to small numbers of waterbirds feeding on the mudflats at Alexandra Dock and those waterbirds using the artificial roosting platform. This is assessed as likely to result in a significant adverse effect on one limited area of mudflat. All other areas of the mudflat are disturbed to a lesser extent and are not considered to experience a significant adverse effect.
- 11.11 Over the eight year survey period during which birds on site have been intensively studied, it has been established that birds do not regularly fly over the portion of the site where the on-site wind turbine will be located, and other regular bird flightpaths are generally below 10 m above the Estuary. The on-site turbine is, therefore, assessed as not resulting in any increased risk of mortality through collisions with turbine blades and no significant adverse effect will result. Noise and visual disturbance to waterbirds from the on-site wind turbine is not predicted to result in a significant adverse effect, and birds are likely to become habituated over time.
- 11.12 Other sources of operational noise and visual disturbance at the site are not assessed to result in significant adverse effects on waterbirds feeding at Alexandra Dock mudflats.



**Figure J: Protected sites close to the proposed development site**



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## 12 Marine Ecology and Nature Conservation

- 12.1 The potential impacts of the proposed development on marine habitats and animals within the Estuary including intertidal habitats and underwater areas (subtidal habitat) have been assessed by ABPmer. These areas lie within the protected sites as detailed in summary section 11 (Ornithology) of this NTS.
- 12.2 A combination of desk-based study and field sampling has been undertaken to establish the existing habitats and animals present.

### Existing Conditions

- 12.3 There are a variety of habitats within the Humber Estuary, both subtidal (areas permanently covered by water) and intertidal (areas covered by water at high tide and exposed at low tide). The two marine habitats most relevant to the proposed development are intertidal mudflats and the subtidal channel.
- 12.4 Invertebrates live within the intertidal mudflats and can provide an important food source for birds. The mudflats at Alexandra Dock are, however, relatively poor and do not support large numbers of invertebrates. The Estuary also contains plankton, fish and marine mammals.

### Construction of GPH

- 12.5 A total of 4.5 ha of intertidal mudflat and 3 ha of subtidal habitat will be lost when the area is reclaimed for GPH. The loss of intertidal and subtidal habitat is assessed not to result in a significant adverse effect on marine ecology (as opposed to ornithology) because although it is of international importance, it represents a very small percentage in relation to the habitat in the Estuary as a whole. The mudflat is of some importance for birds and this is discussed in summary in section 11 (Ornithology) of this NTS.
- 12.6 The disposal of sediment within the Humber Estuary following the dredging of the lead-in berth and widening of the two consented berths is not assessed to result in a significant adverse effect on the benthos (community of organisms which live on, in or near the seabed).
- 12.7 Considerable research has taken place into the effects of underwater construction noise on fish and marine mammals and this has informed the assessment of effects. With soft start piling procedures in place (which will result in gradual increases in noise), timing restrictions on the piling activity, and considering the width of the Estuary (which means fish and marine mammals can pass through the Estuary away from the construction activity), no significant adverse effect is anticipated for fish or marine mammals.
- 12.8 Short-term reductions in water quality will result from dredging and piling due to sediment disturbance, but the change in suspended sediment concentration will fall within the limits of natural variation in the Estuary, and will cause no significant effects.

## Operation of GPH

- 12.9 Long term changes to the subtidal habitat in the dredged berth pockets will occur, but this affects a very small area (5.2 ha) and will not cause a significant adverse effect.

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## 13 Landscape and Visual Amenity

- 13.1 The effects of the proposed development on the surrounding landscape and sensitive visual receptors (locations such as residential properties, local roads and footpaths with views of the development) have been assessed.
- 13.2 In order to identify sensitive locations with views of the site, a 'Zone of Visual Influence' for GPH has been defined based on maps and site visits (see Figure K). Twelve key viewpoints have been chosen from within this Zone (see Figure L).
- 13.3 The views considered in the assessment are shown in Figure L and comprise:
- Viewpoint 1: Victoria Dock Village (see Figures M and N);
  - Viewpoint 2: Victoria Pier;
  - Viewpoint 3: Humber Bridge;
  - Viewpoint 4: Public footpath south of Paull;
  - Viewpoint 5: Sutton Road, Hull;
  - Viewpoint 6: Beverley Bypass;
  - Viewpoint 7: Skidby Mill;
  - Viewpoint 8: Hedon Road (A1033);
  - Viewpoint 9: Tranby Lane (B1231);
  - Viewpoint 10: Preston (B1239);
  - Viewpoint 11: Marfleet Flyover; and
  - Viewpoint 12: Goxhill Haven.

### Existing Conditions

- 13.4 The proposed development site is located on the eastern edge of the city of Hull, an area dominated by docks and industry, and where there are a number of existing tall structures. Beyond the industrial edge of the city the landscape is largely rural and agricultural, low lying and flat with large open skies, long distance views and limited vertical structures. Views towards the city are heavily influenced by the industrial landscape of east Hull and Salt End, including the dockland activities. All these factors have a strong influence on landscape character.

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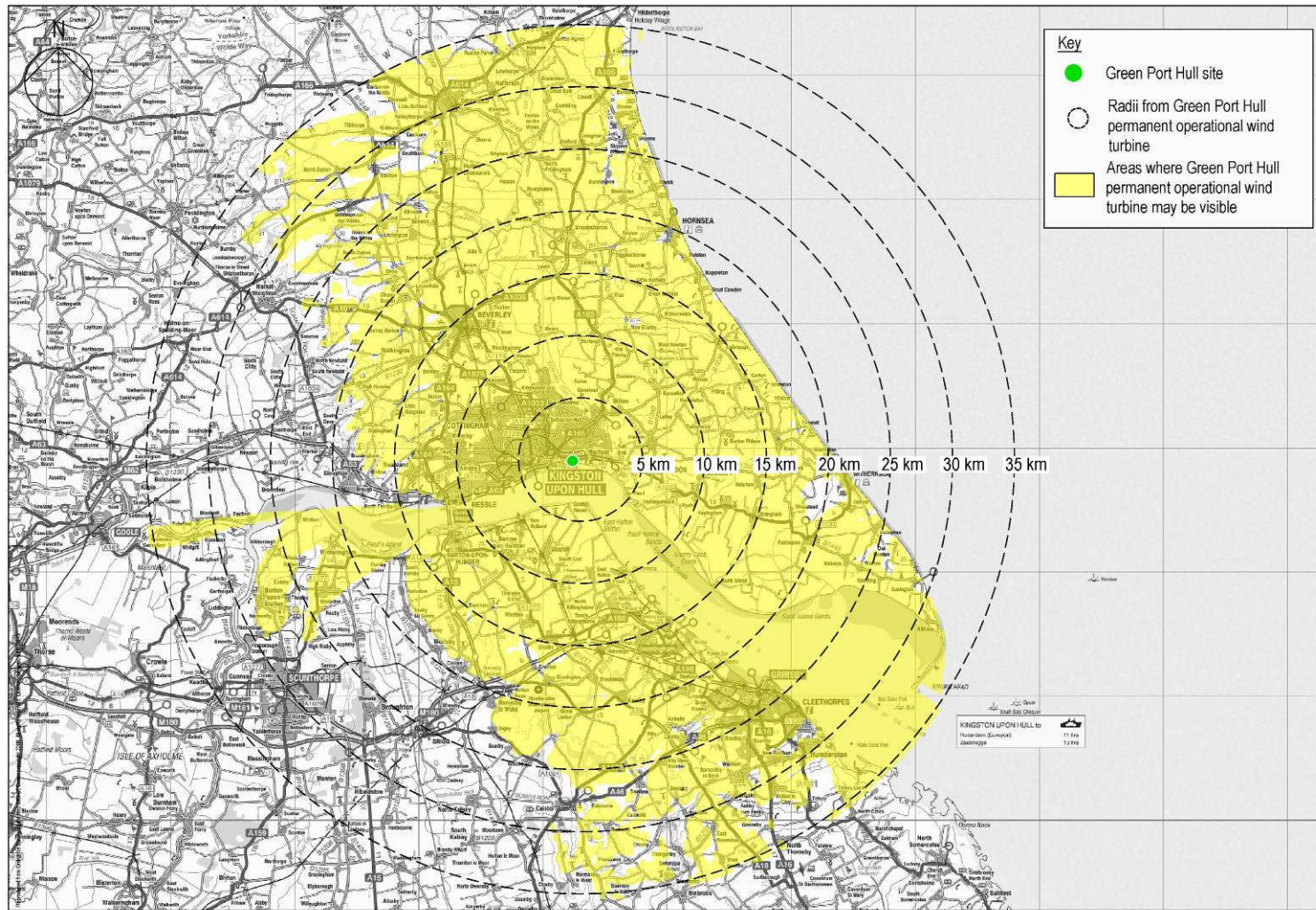
## Construction of GPH

- 13.5 Viewpoints 1, 2, 4, 8 and 12 will experience a temporary significant adverse visual effect during construction. No significant adverse visual effects are predicted during construction for the other viewpoints assessed.
- 13.6 The proposed development will blend into its industrial surroundings and is considered to have no significant adverse effect on landscape character during construction.

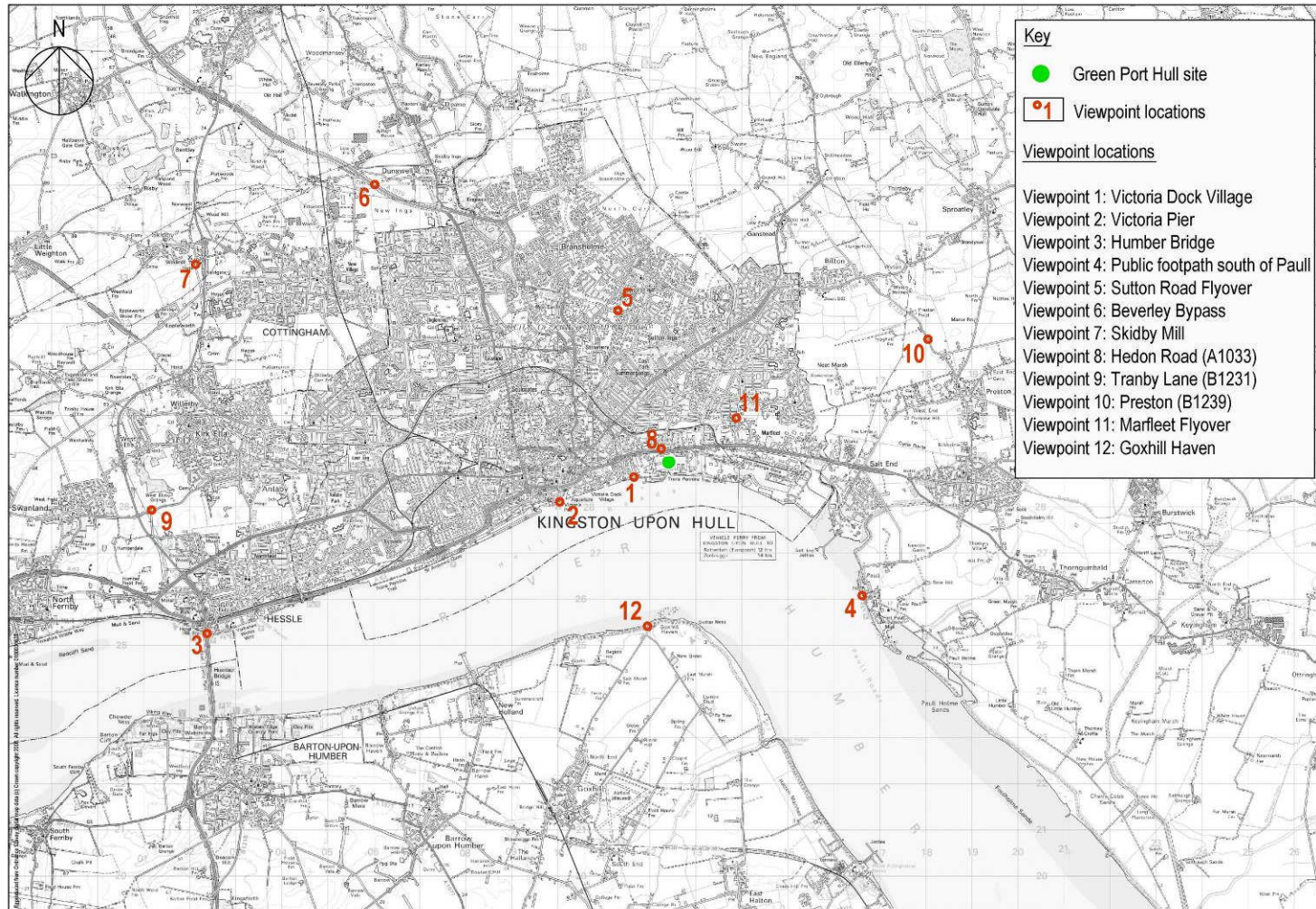
## Operation of GPH

- 13.7 Once the development is operational, which may in the future include the possibility of a small number of fully erected wind turbines present on the quayside, and the planting scheme has matured, Viewpoints 1 (see Figures M and N), 2, 4, 8 and 12 will continue to experience a significant (although reduced) adverse effect on visual amenity as it will not be sufficient to screen the tall structures. These viewpoints are located closest to the proposed development site. Whilst the majority of the works fall within the usual activities of the working port, the height of the on-site wind turbine and the short distances to receptors result in significant adverse effects.
- 13.8 Other viewpoints further from the proposed development site will have clear views of the on-site turbine during good weather, but its location within an industrial setting, against existing tall structures (towers, lighting, chimneys and cranes) means that no significant adverse effects have been identified.
- 13.9 The proposed development will blend into its industrial surroundings and is considered to have no significant adverse effect on landscape character during operation.

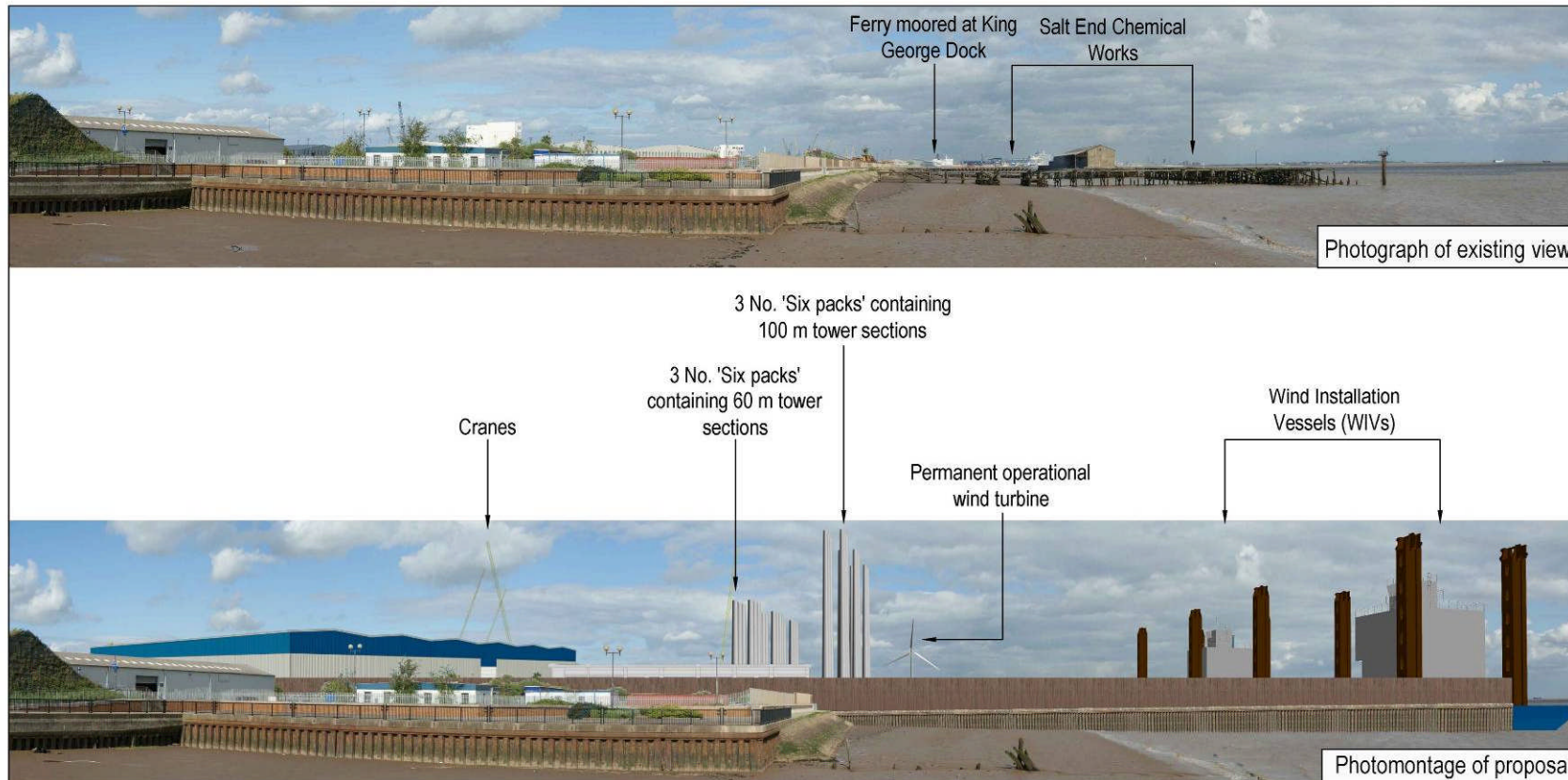
**Figure K: Approximate zone of theoretical visual influence of on-site wind turbine**



**Figure L: Viewpoints for visual assessment**

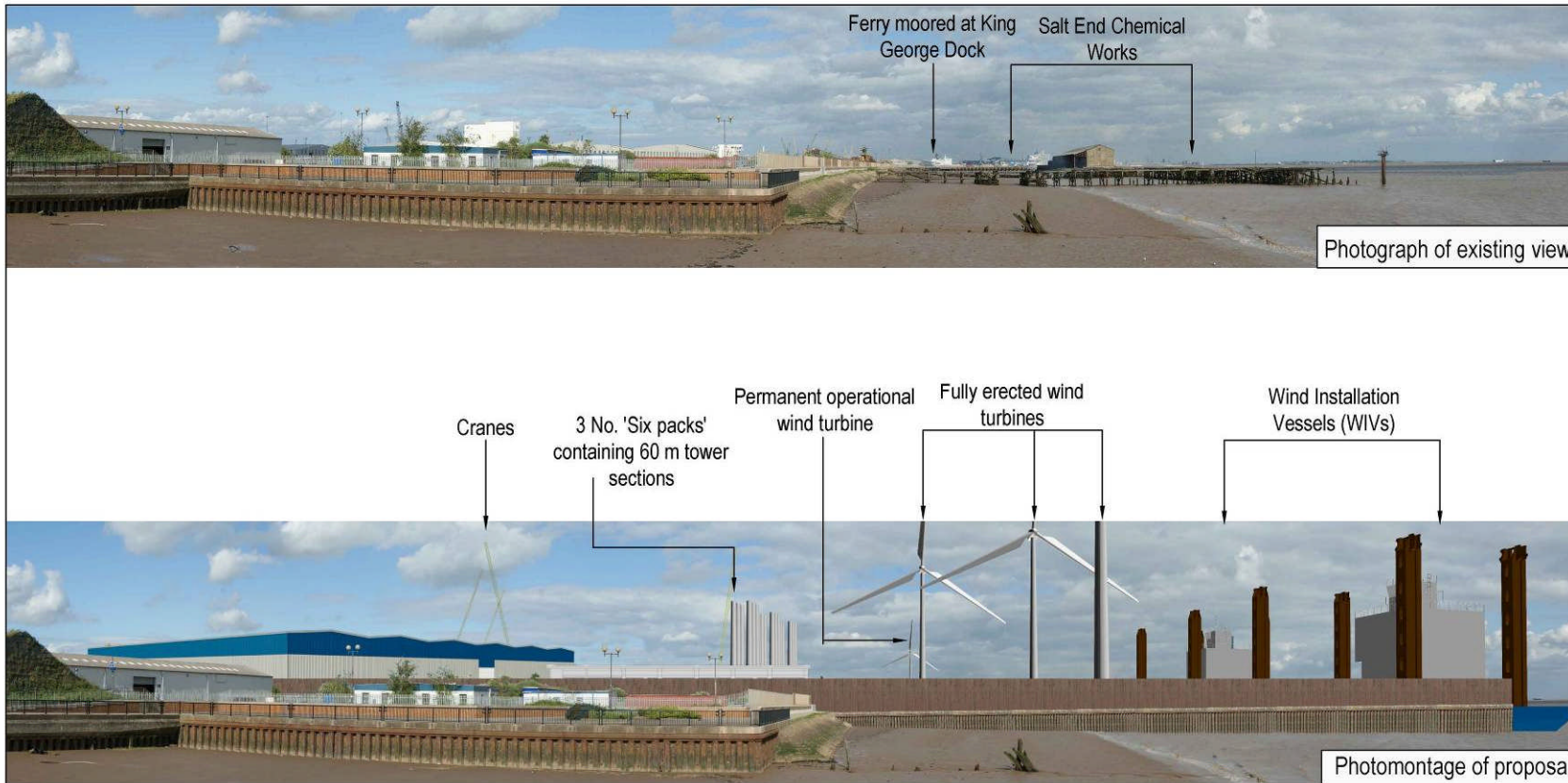


**Figure M: Viewpoint 1 – Victoria Dock Village** without fully erected wind turbines which will be the view for the majority of the time (the closest viewpoint)





**Figure N: Viewpoint 1 - Victoria Dock Village** – realistic worst case scenario showing possibility of fully erected wind turbines (only present for short periods of time) (the closest viewpoint)



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## 14 Cultural Heritage

- 14.1 Potential impacts from the proposed development on cultural heritage features have been assessed. Cultural heritage includes historic buildings and structures together with archaeological sites.
- 14.2 The existing cultural heritage conditions have been established through a review of available information sources, including the relevant Sites and Monuments Records, local planning authorities, historic maps and aerial photographs, and a walkover survey of the site.

### Existing Conditions

- 14.3 Grade II listed structures are present within the proposed development site, specifically a) the Alexandra Dock walls, lock gates, graving docks and extension dock, and b) the Hydraulic Engine House and Tower. The, grade II listed Pumping Station and grade II\* Steam Crane are also located within Alexandra Dock, but fall outside the proposed development site.
- 14.4 Within the wider study area there are a number of locally important archaeological sites, several listed buildings and structures and a conservation area.

### Construction of GPH

- 14.5 The only significant adverse effect identified for the construction phase is on the listed Alexandra Dock structures as a result of the partial infilling of the Dock. This will require the removal of the coping stones (stones used to top the dock walls) around the western part of Alexandra Dock, the remainder of the dock wall being buried as part of the infill operation. The removed coping stones will be re-used where possible within the proposed development site for repair with the remainder buried within the partial infill of Alexandra Dock. Photographs of the dock wall will be taken to create a permanent record.
- 14.6 There will be no significant adverse effects on the other listed structures within and close to the proposed development site.
- 14.7 The marine construction activities are not anticipated to result in any significant adverse effects on marine archaeology.

### Operation of GPH

- 14.8 No significant adverse effects are anticipated on cultural heritage resources as a result of the operation of the proposed development.
- 14.9 A Conservation Management Plan will be prepared for the listed structures identified within Alexandra Dock to ensure the future survival of these historic structures.

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## 15 Commercial and Recreational Navigation

- 15.1 The effects of the additional waterborne traffic from GPH on other ships using the Estuary have been assessed by ABPmer, including consideration of the number of ship movements, navigation routes and marine safety.

### Existing Conditions

- 15.2 The Humber Estuary is one of the busiest waterways in the United Kingdom. The majority of the Estuary is open water, with two main channels for large ships marked by buoys and lights.
- 15.3 ABP, as the Statutory Harbour Authority for the Humber, is responsible for the safety and management of ships using the Estuary. The role is carried out by an independent organisation, Humber Estuary Services, under the authority of the Harbour Master 'Humber'. The movements of all ships through the Estuary are tracked and larger ships generally use a pilot to help navigate through the Estuary.
- 15.4 Information on current and predicted future use of the Estuary by ships has been provided by Humber Estuary Services. There were around 29,500 commercial shipping movements in 2010.

### Construction of GPH

- 15.5 Most of the construction materials will be delivered to site by sea, and construction of the marine facility and partial infilling of Alexandra Dock will require the use of ships for dredging, disposal of dredged sediment and piling. There will be approximately 430 ship movements to deliver dredged material for disposal within the Humber Estuary and approximately 500 ship movements to bring in material for use in the reclamation and partial infill of Alexandra Dock.
- 15.6 This will not result in a significant adverse effect on other commercial and recreational navigation activities during construction.

### Operation of GPH

- 15.7 GPH will handle a mixture of ship types and sizes, including Ro/Ro and Lo/Lo ships to bring parts and materials to GPH, and WIVs (see Picture A) for taking completed wind turbines out to sea.
- 15.8 It is estimated that approximately 144 WIVs and around 150 Ro/Ro and Lo/Lo ships will call at GPH per year, in addition to the ships already using Alexandra Dock. This is approximately an increase of 1.9% on the existing marine traffic in the Estuary, which is not a significant increase and will be managed by Humber Estuary Services.
- 15.9 With the application of mitigation measures (such as procedures for mooring and the use of tugs), no significant adverse effects are predicted.

- 
- 15.10 The availability of additional berths at GPH will have a beneficial (but not significant) effect on navigation by providing additional emergency ship moorings.

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## 16 Land Quality

- 16.1 Soil quality at the site and the potential for effects of land contamination on people and the environment has been assessed.
- 16.2 The assessment has considered potential sources of contamination, receptors (i.e. people and environmental features that could be affected by contamination) and 'pathways' (i.e. the means by which any contamination could reach a receptor) between the two. Effects are only possible where a source, receptor and pathway are all present.
- 16.3 Historic data has been reviewed, a walkover survey has been completed and data has been gained from a ground investigation undertaken for the GPH site.

### Existing Conditions

- 16.4 The site is located within an industrial area and is used for port operations. Historical uses on the site included railway sidings, reclaimed land, general storage, tanks, timber storage and treatment, oil tanks and workshops.
- 16.5 The Environment Agency classify the underlying geology as a Principal Aquifer, which provides a high level of groundwater storage beneath the site.
- 16.6 Recent site investigations have determined that ground gas levels are at a level that have the potential to pose a risk to site users and buildings.

### Construction of GPH

- 16.7 Possible sources of contamination include previous land uses such as railway sidings, the use and storage of chemicals for e.g. for the treatment of timber.
- 16.8 A range of possible receptors have been identified, including people working on the site during construction, ecological habitats and species near to the site, watercourses (the Humber Estuary and Holderness Drain) and groundwater.
- 16.9 Pathways could be created between the site and groundwater when the ground is disturbed during construction, for example during piling.
- 16.10 There is a potential hazard associated with the presence of ground gases within the site, but this will be mitigated with the implementation gas monitoring (as appropriate), gas protection measures in building design and suitable training of staff.
- 16.11 Based on the assessment of all data, and assuming the implementation of a number of detailed design and impact avoidance measures none of the potential effects on land quality are considered to result in significant adverse effect.

## Operation of GPH

- 16.12 During operation, materials that will be stored on site have the potential to adversely affect land quality due to accidental leakage or spillage (e.g. fuels and oils) and risks to users of the site associated with the presence of ground gases.
- 16.13 There is a potential hazard associated with the presence of ground gases within the site, but this will be mitigation through gas protection measures and suitable training of staff.
- 16.14 Therefore there are also no significant adverse effects on land quality during operation.

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## 17 Waste Management

- 17.1 The types and volumes of waste from the proposed development have been estimated using data from a range of similar wind turbine manufacturing facilities within the UK and Europe.
- 17.2 The potential effects of waste generated by the proposed development have been considered in terms of relevant legislation, the amounts of waste to be produced, the regional capacity to treat or dispose of this waste and the methods by which the waste will be managed.

### Existing Conditions

- 17.3 Information on current waste management plan procedures at the Port of Hull is contained within the Port's Waste Management Plan. This includes details of relevant legislation, port waste reception facilities and the prior notification system for waste brought into the Port by ships, including waste data collection.

### Construction of GPH

- 17.4 It is estimated that 1,500 tonnes of waste will be produced during the construction phase of GPH. In comparison, waste of approximately 13 million tonnes per year is produced in the Yorkshire and Humber region as a whole. In this context the construction waste associated with GPH is considered to be immaterial, and hence, will not have a significant adverse effect.
- 17.5 Measures will be put in place to reduce the impacts such as using recycled construction materials and re-using construction waste on-site, where feasible. A Site Waste Management Plan will be prepared and implemented for the construction phase.

### Operation of GPH

- 17.6 Ships using GPH are predicted to generate approximately 300 tonnes of waste per year. Approximately 1,565 tonnes per year will be generated by the GPH operations and waste produced from staff working at the site will be approximately 246 tonnes per year.
- 17.7 The proposed development will be operated in accordance with the Port Waste Management Plan. UK legislation, policies and principles of waste management will be followed, including the principles of the waste hierarchy (reduce, re-use, recycle, recover, dispose).
- 17.8 Sufficient capacity within the region to manage the anticipated waste arisings from GPH has been identified. No significant adverse effects are, therefore, anticipated.

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## 18 Shadow Flicker and Public Safety in Relation to the Permanent Operational Wind (During Operation)

18.1 Shadow flicker occurs under conditions when the sun passes behind a wind turbine and casts a shadow over nearby properties. When the blades rotate, shadows pass repeatedly over the same point causing an effect called 'shadow flicker'. Shadow flicker only occurs through openings such as windows and has the potential to cause disturbance and annoyance to nearby residents and road users.

18.2 The shadow flicker model mapped the area around the location of the on-site wind turbine (incorporating the position of the sun and topography) to identify properties and roads that could be affected to calculate theoretical times of shadow flicker for each receptor.

18.3 Public safety issues relevant to wind turbines include blade throw (the risk of a wind turbine parts becoming detached from the wind turbine), icing (the risk of ice forming on the wind turbine and falling off) and spread of fire (for example following a lightning strike). Standard design and operating measures are in place for all wind turbines to ensure these do not occur and include (see Chapter 18 of the ES for a full list):

- smoke detectors are present in all cabinets, nacelle, tower and ventilation ducts of wind turbines. An Active Fire Fighting System may be installed;
- automatic switch-off of wind turbine and complete disconnection from power supply system in the case of fire risks being identified;
- regular inspections and maintenance checks will be made to the wind turbine in order to prevent technical failures from occurring;
- the wind turbine will be fitted with lightning and overvoltage protection measures; and
- the wind turbine will be fitted with a vibration sensor which would detect an imbalance in the system (in the event that icing was to build up on the blades) and automatically shut down the turbine.

### Existing Conditions

18.4 There are no wind turbines currently located in the vicinity of the potentially affected properties and roads around the site.

### Construction of GPH

18.5 The construction phase is not relevant to this assessment because effects can only occur once the on-site wind turbine is operating.



## Operation of GPH

- 18.6 There is potential for shadow flicker to affect some properties around the site, which may cause some nuisance to local residents. The model is considered to present the 'worst case' because it does not take into account existing buildings, vegetation, hours of sunshine, wind direction and topography which may prevent the impact.
- 18.7 The model has identified that only one residential receptor (a property located at Hedon Road Cemetery) has the potential to be affected by over 30 hours of shadow flicker incidences per year (the accepted industry standard) but that falls outside the 500 m threshold within which shadow flicker is considered to cause an effect.
- 18.8 Should local residents experience any nuisance associated with shadow flicker, mitigation measures will be applied on a case-by-case basis and may include planting vegetation, providing blinds or curtains or control of the on-site turbine. With mitigation, no significant adverse effects are identified.

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## 19 Electromagnetic Interference (During Operation)

- 19.1 Wind turbines can cause electromagnetic interference in two ways:
- physical interference, where the blades of the turbine cut across an electromagnetic signal affecting microwave links, television signals, mobile telephones and/or airport radar systems; and
  - electrical interference, caused by the operation of the generator which may affect communication equipment near to the turbine.
- 19.2 The assessment considers potential impacts on telecommunications networks, television reception and civil and military aviation safeguarding issues in the area surrounding the proposed on-site wind turbine following consultation with a number of organisations. Aviation issues are discussed in summary in section 20 (Aviation Assessment) of this NTS.

### Existing Conditions

- 19.3 Electromagnetic interference in relation to the on-site wind turbine is not experienced at the proposed development site because there is currently no on-site wind turbine in operation.

### Construction of GPH

- 19.4 The construction phase is not relevant to this assessment because effects can only occur once the on-site wind turbine is operating.

### Operation of GPH

- 19.5 In the unlikely event that effects on digital television reception are reported, mitigation measures are available to provide an alternative means of receiving the signals and these will be implemented as required.
- 19.6 The effects of the permanent operational wind turbine on telecommunications, television and utilities will not be significant following the implementation of the proposed mitigation measures (if required).

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## 20 Aviation Assessment (During Operation)

20.1 The aviation assessment has been prepared by Cyrrus Limited and considers two main issues:

- the erection of a permanent operational wind turbine; and
- the construction and operation of the HLS.

### Existing Conditions

20.2 There are currently emergency air support units regularly flying over and along the Estuary at low altitude including Humberside Police (based at Humberside Airport), Yorkshire Air Ambulance (based at Leeds Bradford Airport) and RAF Search and Rescue No. 202 Squadron 'E' Flight (based at RAF Leconfield).

20.3 Humberside Airport is the closest Airport, approximately 18 km to the south. There is also a Ministry of Defence (MoD) site located at Staxton Wold, approximately 50 km to the north where the Royal Air Force (RAF) operates an Air Defence Radar.

### Construction of GPH

20.4 Details of the maximum height of construction equipment will be provided to Humberside Airport so that pilots are made aware of potential hazards as appropriate.

20.5 No significant adverse construction effects are anticipated as aviation effects are largely associated with the operation of the on-site wind turbine and HLS.

### Operation of GPH

20.6 The on-site wind turbine and all other tall structures will be suitably lit and the rotor blades, nacelle and upper  $\frac{2}{3}$  of the supporting tower of wind turbines will be white to meet with standard Civil Aviation Guidance.

20.7 The HLS has been designed and will be operated following best practice, as published in international standards and other recommended practices documents. It will follow UK Civil Aviation Authority (CAA) regulatory requirements.

20.8 The HLS will be used an estimated two to three times a week, based on modelling undertaken by Siemens. This modelling is based on older types of offshore wind turbines which have a larger number of moving parts and are therefore more prone to mechanical faults.

20.9 The increase in helicopter movements into and around Hull will be minimal in comparison with the existing operations conducted by, for example, the local Police Air Support Unit.

20.10 Inbound and outbound helicopter flights will follow agreed routes integrating the operation of the HLS into existing, and well established, aviation activity in the area.

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20.11 The Ministry of Defence has confirmed that they have no concerns regarding the GPH development with regards to possible radar interference from the on-site wind turbine. ABP are currently in discussion with Humberside Airport as regards to any residual concerns relating to their Air Traffic Control procedures. No significant adverse aviation effects are anticipated as a result of the on-site wind turbine and HLS.

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## 21 Cumulative and Combined Effects

21.1 Cumulative effects arise when impacts from two or more proposed developments affect the same environmental receptor, for example noise from two proposed developments affecting a residential property located between the two development sites. It is only possible to consider the effects of other proposed developments when the assessment of these effects has been published. Existing developments are not considered because they are already taken into account as part of the existing conditions. All the technical specialists as listed in Table 1.1 have contributed to this assessment.

21.2 Combined effects arise when two or more types of impact from the same development affect the same environmental receptor in a particular way e.g. the effect that noise and visual disturbance together might have on feeding birds.

### Existing Conditions

21.3 A number of other developments are proposed in the vicinity of the site (see Figure O) and could therefore give rise to cumulative effects with GPH. These are:

- Hull Riverside Bulk Terminal to the east of the site near Salt End, for which consent has not yet been granted;
- Able Marine Energy Park on the opposite side of the Humber Estuary near Immingham, for which a formal application has not yet been made;
- Able Humber Port Logistics Park on the opposite side of the Humber Estuary near Immingham, for which consent has been granted;
- Grimsby Roll-on/ Roll-off Jetty on the opposite side of the Humber Estuary at Grimsby, for which consent has been granted;
- Energy from Waste and Recyclate Bulking Facility near Salt End, for which consent has been granted;
- Vivergo Fuels Ltd Bioethanol Plant at Salt End, for which consent has been granted and construction is well underway;
- Phase IV of Humber Sea Terminal at North Killingholme on the opposite side of the Estuary at North Killingholme, for which a formal application has not yet been made;
- Works to the Immingham Outer Terminal Approach channel deepening in order to improve access to the Immingham Oil Terminal on the opposite side of the Humber Estuary at Immingham, for which consent has been granted;
- Trinity Quays at the city centre of Hull, for which consent has been granted;
- Marfleet Environmental Technology Park which is located nearby along Hedon Road, for which consent has been granted; and

- Biomass Plant at King George Dock, for which consent has been granted.

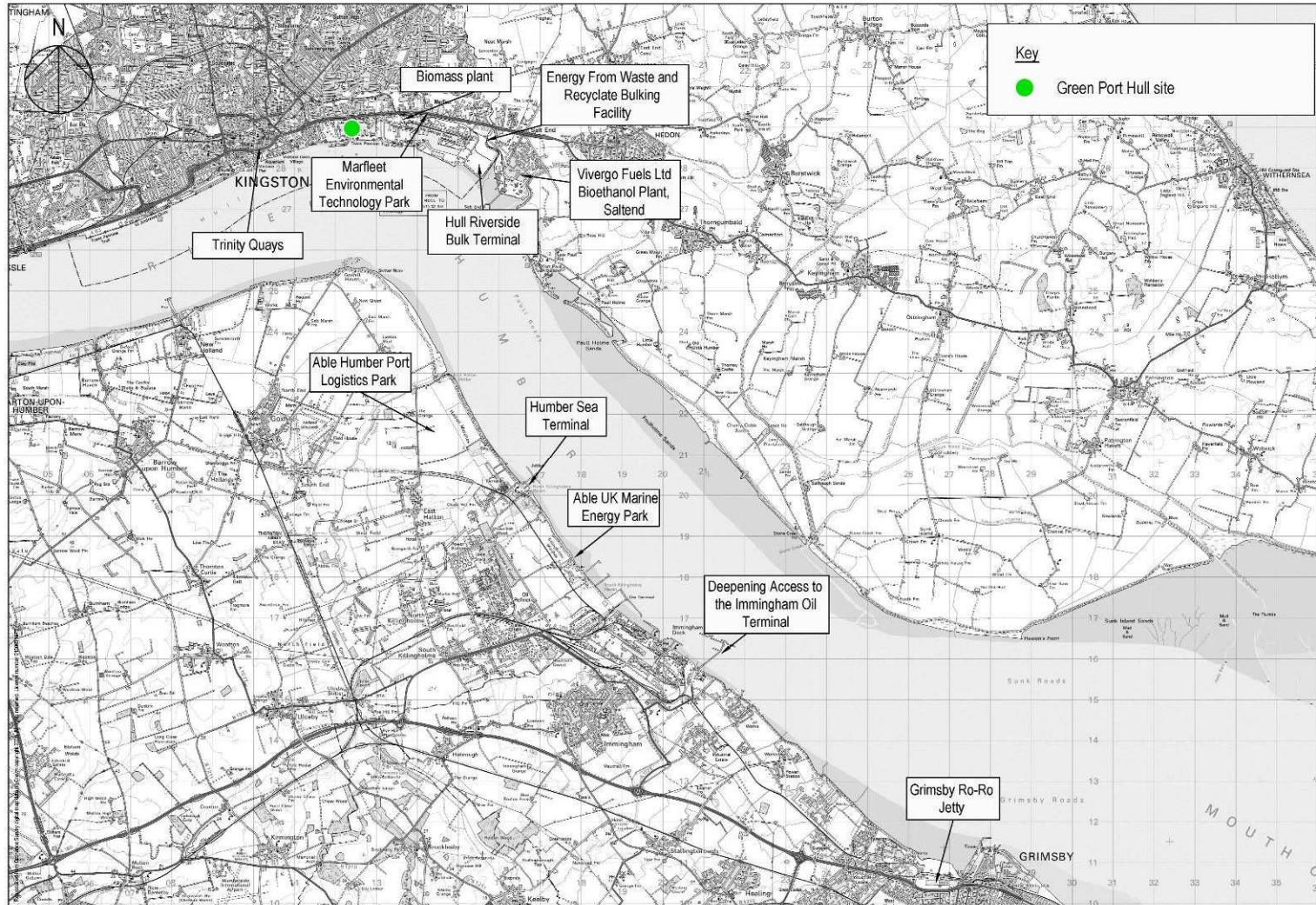
## Construction of GPH and Other Developments

- 21.4 If the construction periods of any of the proposed developments identified above overlap, there is the potential for cumulative effects during construction.
- 21.5 Some significant beneficial and adverse cumulative effects have been identified as a result of the construction activities. Beneficial cumulative effects will be the re-use of dredged material produced by the Immingham Outer Terminal Approach deepening (avoiding the impacts that would otherwise be associated with the disposal of this material), and beneficial cumulative effects on shipping from the deepened navigation channel of the Estuary and the additional berths that will be available at GPH.
- 21.6 Adverse cumulative effects will result from changes to suspended sediment concentrations in some places within the Humber Estuary as a result of the dredging and disposal of material, possible changes to the long term morphology (shape) of the Estuary due to the disposal of material, the loss of areas of intertidal habitats used by waterbirds, and the potential trapping of certain fish during dredging.
- 21.7 Cumulative construction impacts will be temporary in nature and with the exception of those listed above have been assessed to be not significant.
- 21.8 The only significant adverse combined effect that has been identified derives from noise disturbance during piling acting in combination with vibration which has the potential to disturb some residential receptors at Victoria Dock Village.

## Operation of GPH and Other Developments

- 21.9 Significant adverse cumulative effects have been identified with respect to coastal and estuarine processes during operation, which could be beneficial or adverse. These include changes to water speeds and sediment movements.
- 21.10 It is important to note that generally, however, GPH does not contribute largely to any cumulative effects during its operation, as the majority of the GPH effects will be localised.
- 21.11 No significant combined effects have been identified during the operational phase of the proposed development.

**Figure O: Other developments close to the proposed development site**



## 22 Further Information

- 22.1 For further, more detailed information please refer to the full ES.
- 22.2 A paper copy of the ES is on display during the consultation period at:
- ABP Hull  
Port House  
Northern Gateway  
Hull  
HU9 5PQ
- 22.3 The ES can also be viewed electronically at [www.greenporthull.co.uk](http://www.greenporthull.co.uk).



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## 23 References

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- Hull City Council (2011) *Hull Core Strategy Publication Version.*
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