

BiGGAR Economics

Economic impact of Aberdeen Harbour Nigg Bay
Development

A final report to
Scottish Enterprise

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1 EXECUTIVE SUMMARY

1.1 Current Impact of Aberdeen Harbour

Aberdeen Harbour is the principal commercial port serving the north east of Scotland and one of Europe's leading marine support centres for offshore energy. The Harbour plays a key role in the economies of both Aberdeen and Scotland, **currently generating around £1.5 billion GVA and 12,000 jobs for the Scottish economy.** This includes £1.4 billion and 9500 jobs for the Aberdeen City and Shire economy and £1.2 billion GVA and 9,630 jobs associated with off-site activity that would not occur if the Harbour did not exist.

At present it is estimated that around two thirds of the economic impact associated with Aberdeen Harbour is linked to the key role the Harbour plays in supporting the oil and gas sector.

1.2 Future Impact of Aberdeen Harbour

In recent years the Harbour has experienced significant growth in demand for its services but despite investing significantly in upgrading facilities, the existing site is now operating at or near full capacity. It is clear additional capacity is required to retain activity in the oil and gas sector in Scotland. If this capacity is not developed, then there is a risk that new and existing demand will be lost to Norway. Capacity constraints at the Harbour are also likely to hinder existing and potential users from developing new market opportunities in areas such as renewable energy, decommissioning, passenger ferries and cruise liners.

In order to accommodate existing and future demands from harbour users, the Harbour Board is considering options for expanding the Harbour into Nigg Bay to the south of the existing harbour, clear of the City centre at a cost of around £320 million. In order to maximise the efficiency of the new harbour it would also be necessary to upgrade the roads infrastructure in the surrounding area. This investment would help to make industrial land surrounding the new Harbour more attractive to potential investors and could result in a significant increase in employment in this area.

If the new Harbour is developed as planned then it is estimated that in 20 years time it will be contributing £2.0 billion GVA to the Scottish economy each year and supporting around 15,510 jobs, around 30% more than its current impact. With the planned development the Harbour would be able to maintain its competitive position within the oil and gas sector and would be able take advantage of new markets.

If the new Harbour is not developed then it is estimated that in 20 years time the Harbour will be contributing £1.1 billion GVA to the Scottish economy each year and supporting around 8,350 jobs, around 30% less than its current impact. It is expected that this decline will be largely due to a reduction in activity within the UK oil and gas sector as a whole and as opportunities are lost to Norway.

This report has also considered a scenario where a new Harbour is developed at Nigg Bay but the required improvements are not made to the surrounding roads infrastructure. It is expected that this would result in less development occurring in the industrial land surrounding the Harbour. If this were to occur then it is

estimated that in 20 years' time Aberdeen Harbour will be contributing £1.4 billion GVA to the Scottish economy each year and supporting around 11,365 jobs.

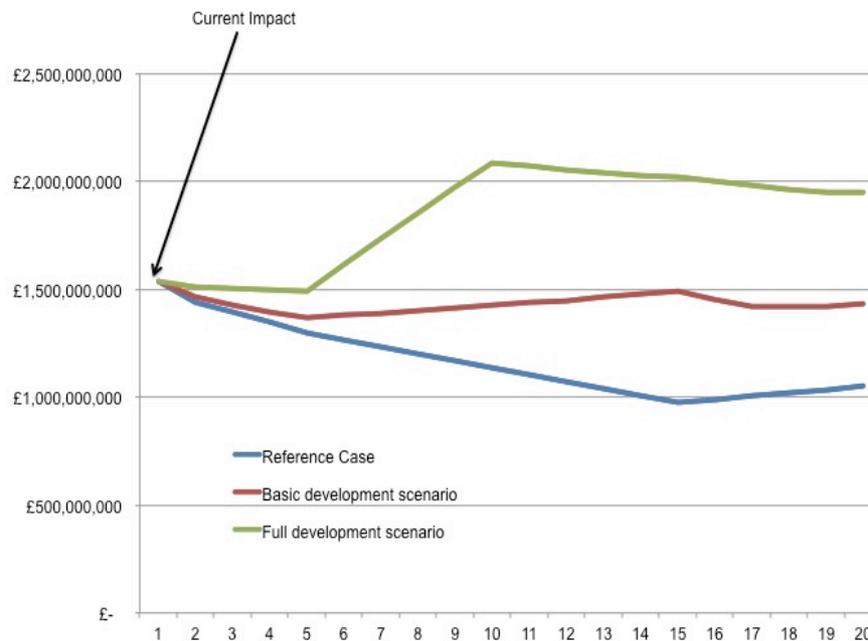
The future impact of Aberdeen Harbour under each of these three future scenarios is presented in Table 1-1 and figure 1.1. These impacts do not include the construction impacts associated with the proposed investment itself, in accordance with Scottish Enterprise guidance on economic impact assessment.

Table 1-1 – net economic impact of Aberdeen Harbour in year 20

Future development scenario	Description	Aberdeen C&S		Scotland	
		Jobs	GVA (billions)	Jobs	GVA (billions)
Full development scenario	New harbour developed at Nigg Bay and necessary improvements made to surrounding roads infrastructure.	12,350	£1.8	15,510	£2.0
Basic development scenario	New harbour developed at Nigg Bay but no improvements made to surrounding roads infrastructure.	9,270	£1.3	11,365	£1.4
Reference case	Status quo - new harbour at Nigg Bay does not proceed	6,800	£1.0	8,350	£1.1

Source: BIGGAR Economics economic impact model

Figure 1-1 - GVA of Aberdeen Harbour over time – alternative development scenarios



Over a 20 year period creating a new harbour at Nigg Bay would generate *additional* GVA for the Scottish economy with a net present value of £8.7 billion.

Over a 20 year period creating a new harbour at Nigg Bay but with no improvements made to the surrounding roads infrastructure would generate *additional* GVA for the Scottish economy with a net present value of £3.4 billion

This implies that improving the roads infrastructure around Nigg Bay would generate *additional* GVA for the Scottish economy with a net present value of £5.3 billion and support around 4,145 net additional jobs.

2 INTRODUCTION

This report presents the results of an economic impact study by BiGGAR Economics and GL Garrad Hassan of proposals by Aberdeen Harbour Board to develop a new harbour at Nigg Bay.

2.1 Background

Aberdeen Harbour is the principal commercial port serving the north east of Scotland and one of Europe's leading marine support centres for offshore energy. The Harbour plays a key role in the economies of both Aberdeen and Scotland as a whole. During 2012 it handled more than 8,100 vessels, carrying 5.1 million tonnes of cargo and around of 150,000 passengers.

In recent years the Harbour has experienced year on year growth in demand for its services and has responded to this by investing in modern, fit for purpose facilities. The Harbour has for example recently completed £5.4 million of improvements to the entrance channel and the £30.0 million Torry Quay realignment project is due for completion in by the end of 2013. Despite this investment, the Harbour Board has received a strong message from its customers that the port must grow in order to better accommodate existing and emerging demands.

In response to this demand, Aberdeen Harbour initiated a consultation with key stakeholders to consider various scenarios for the future growth of the Port in 2012. The preferred option emerging from this exercise was an expansion of the Harbour into Nigg Bay, to the south of the existing harbour mouth, at an estimated cost of £320 million.

The Harbour Board has now commissioned a study to investigate the feasibility of an expansion into Nigg Bay and as part of this study, Scottish Enterprise commissioned a consortium led by BiGGAR Economics to undertake an economic impact assessment of the proposals. This report presents the results of the economic impact assessment.

2.2 Study Objectives

The aim of this study is to demonstrate economic importance of the current harbour and its potential contribution should a development at Nigg Bay go ahead. The study considers the contribution that the Harbour currently makes to the economy of Aberdeen City and Shire and to the Scottish economy as a whole. It also considers the role that the Harbour plays in supporting Scotland's oil and gas industry and the future role it could play in supporting the development of the off-shore renewable energy and cruise tourism sector.

2.3 Structure and Approach

The remainder of this report is structured as follows:

- Chapter 3 describes the proposals to develop a new harbour at Nigg Bay project and the relevant policy context;
- Chapter 4 describes the economic and market context for the development;
- Chapter 5 explains how each type of impact has been calculated;

- Chapter 6 presents the baseline economic analysis;
- Chapter 7 explains the assumptions that have been used to calculate the future impact of Aberdeen Harbour;
- Chapter 8 summarises the reference case, if a new harbour is not created at Nigg Bay;
- Chapter 9 summarises the impact of the full development scenario, where a new harbour is developed at Nigg Bay as proposed;
- Chapter 10 summarises the impact of the basic development scenario, where a new harbour is developed but no improvements are made to the surrounding roads infrastructure;
- Chapter 11 presents the summary and conclusions of the report;
- Chapter 12 contains an appendix that provides a sensitivity analysis of some of the key assumptions used in this report;
- Chapter 13 contains an appendix, which provides a glossary of terms used in this report; and
- Chapter 13 provides a summary of the results of the economic base-line and three development scenarios presented in this report.

2.4 Acknowledgements

BiGGAR Economics and GL Garrad Hassan would like to thank the individuals listed in Table 2-1 who contributed to this study.

Table 2-1 - List of consultees

Name	Company
James Argo	Aberdeen City Council
James Bell & Ken Reilly	Aberdeen Harbour Board
Gary Florence	BP Exploration Operating Company Ltd
Fiona Haley	Chevron
Innes Cameron	Clarkson Enship
Tracy Morrison	ConocoPhillips
Michel Milne	Dales Properties (Scotland) Ltd
Dan Taylor	Enviroco
Mike Packer	Euroline Shipping Company Ltd
Michael Henderson & John Goodchild	GAC Shipping (UK) Ltd
Ron Tomal	GB Oils Ltd (Caledonian Oils)
Ian Jack	MI Drilling Fluids UK Ltd
Johan Pretorius	NOV Brandt
Ken Cruickshank	Oil and Gas UK
Mike Porter	Peterson Ltd
Hugh Chisholm	Petrofac Training Services
David Rennie	Scottish Enterprise
Stuart Garret	Serco Northlink Ltd
Jackie Alexander	Shell
Neil Gordon	Subsea UK
Chris Coull	TAQA
Tim Varley	Total

3 POLICY CONTEXT AND PROJECT DESCRIPTION

This chapter describes the Nigg Bay development proposals and the context in which they have been developed.

3.1 Policy Context

This section describes the current policy context relevant to the proposed development.

3.1.1 Government Economic Strategy

The development of the energy sector is one of the Scottish Government's priorities. The Scottish Government Economic Strategy (GES) highlights seven key growth sectors that offer strong opportunities for growth. These opportunities arise either from Scotland's existing or potential comparative advantage in human or natural resources. One of the sectors highlighted as a growth sector is energy (including renewables).

In order to take advantage of the opportunities within these sectors and to increase or maintain Scotland's comparative advantages the GES highlights key actions. One of the actions is "maintaining and developing the competitiveness and long-term future of the oil and gas sector by developing the position of Aberdeen as a world wide supply chain hub, securing increased recovery rates in Scottish waters and supporting collaboration between oil and gas and low carbon energy".

The GES sets out six strategic priorities to guide economic policy. These are:

- supportive business environment;
- transition to a low carbon economy;
- learning, skills and well-being;
- infrastructure development and place;
- effective government; and
- equity.

The priority of 'transition to a low carbon economy' was the only strategic priority that was added in 2011, the other five have been strategic priorities since 2007. The transfer of knowledge from oil and gas to renewables is highlighted as essential to securing Scotland's place as the Energy capital of Europe. The strategy also highlights the potential for companies operating within the energy market to diversify into low carbon technologies.

The priority of infrastructure development and place addresses the important role infrastructure plays in enabling the growth of sectors and regional economies. In the GES the Cabinet Secretary for Infrastructure and Investment, Alex Neil, describes investment of infrastructure as a 'legacy of assets' that are essential drivers of competitiveness and long-term growth. One of the actions identified to address this priority is the Marine (Scotland) Act, which includes measures to boost investment in marine renewables and balance competing demands on Scotland's seas.

3.1.2 Oil and Gas

The Scottish oil and gas industry strategy¹ describes the priority actions and vision for the sector in Scotland. The vision for the industry in Scotland is for one that is increasingly integral to the Scottish economy but outward looking, with Scottish expertise and products in high demand in the global export market.

One of the key issues highlighted in the strategy is the presence of adequate and effective infrastructure. It is seen as a priority to invest in improvements in Aberdeen City and Shire to ensure that Scotland remains competitive. It is only through investments in infrastructure that Scotland will continue to be an attractive long term investment location. The development of transport infrastructure in the North East of Scotland is seen as vital to ensure connectivity between the sector in Scotland and markets in Europe and further afield.

3.1.3 Marine Renewables

Scottish Enterprise and Highlands and Islands Enterprise have considered the scale of infrastructure investment that is required to support the renewables sector in Scotland. The two reports produced are the National Renewables Infrastructure Plan (N-RIP). The first report² highlights the challenge of developing the required infrastructure but warns that this is critical if Scotland is to become the base for construction, assembly and operations and maintenance for offshore renewable energy.

The N-RIP stage 2 document³ describes the opportunities and infrastructure development requirements for Aberdeen Harbour. The N-RIP was written at the time of the redevelopment of the Torry Quays area of Aberdeen Harbour and discusses the £30 million investment and how this will create berths for larger ships. It also notes that the entrance channel to Aberdeen Harbour is too narrow for some vessels. Although the navigation channel was widened in 2012 there is still only one suitable berth to accommodate large offshore wind deployment vessels.

The Plan also highlights the potential for existing expertise in offshore engineering and logistics to be transferred to the offshore renewable sector. The existence of this expertise is identified as one of Scotland's key assets in the potential for marine based renewables.

The N-RIP stage 2 document also explains the need for creating industry clusters around key infrastructure investment locations, similar to the current subsea cluster that exists in Aberdeen City and Shire. It suggests that these clusters should incorporate the supply chain for offshore renewables. The development of the land beside Nigg Bay could contribute towards a marine renewable cluster in Aberdeen City and Shire.

3.2 Project Description

Aberdeen Harbour has a long history dating back almost 900 years. Historically development at the port was closely associated with the fishing industry but this began to change in the 1960s with the emergence of the North Sea Oil sector.

¹ Scottish Enterprise, *Oil and Gas Strategy 2012 – 2020*, May 2012

² Scottish Enterprise, *National Renewables Infrastructure Plan, February 2010*

³ Scottish Enterprise, *National Renewables infrastructure Plan Stage 2, July 2010*

By 1984, nine oil bases had been developed at the port and in 2002 BP Exploration made the decision to transfer its offshore marine support operations to Aberdeen. Today the Harbour is recognised as one of Europe's leading marine support centres for offshore energy and is home to a large cluster of businesses either directly involved in the oil and gas sector or supplying services to it.

In addition to its role in the oil and gas sector, Aberdeen Harbour also handles cargo for a wide range of industries from more than 45 countries worldwide. In 2012 Aberdeen Harbour handled in excess of 28 million tonnes of shipping and more than 5 million tonnes of cargo, worth more than £1.5 billion.

Each year the Harbour also welcomes in excess of 150,000 passengers. The vast majority of these passengers transit the port on the scheduled Serco NorthLink ferry services to and from Orkney and Shetland and the remainder arrive on the small but growing number of cruise ships that call at the Harbour each year. In 2012 Aberdeen Harbour welcomed just nine cruise liners but during 2013 this increased to 13 vessels.

3.2.1 Rationale for Expansion

In recent years the Harbour has witnessed a year on year increase in activity and is now operating close to capacity. According to the Harbour Board, this is now hindering potential growth in traffic at the Harbour and could lead towards a decline in future operations due to the alternative existing and planned facilities in Norway.

Options for expanding operations are heavily constrained by the Harbour's city centre location and neighbouring activities and the Harbour is unable to make further gains through reconfiguration of existing estate. In order to continue to grow as a business and to avoid losing trade, industry and skills to overseas competitors, it will therefore be necessary for the Harbour to extend operations elsewhere.

3.3 Nigg Bay Development Proposals

In 2012 Aberdeen Harbour Board commissioned a study⁴ to consider the feasibility of three possible development options. This study recommended that the Harbour Board develop proposals to extend operations in Nigg Bay, to the south of the Girdleness Headland. This location is preferred because as a natural bay it provides some shelter from the sea and because the features of the bay would enable the length of breakwaters to be minimised.

The location is to the south of the city centre with potential to enjoy good transport links connecting to the A90 and the planned Aberdeen Western Peripheral Route (AWPR). One of the benefits of this location is that any additional harbour related road traffic could be handled clear of the already congested roads in the centre of the city.

The new harbour would occupy a large proportion of Nigg Bay, comprising approximately 1,400 meters of new quays (13-14 new berths). At present the total length of quays at Aberdeen Harbour is 5,856 meters so the Nigg Bay expansion would represent an increase in total quay length of almost a quarter. The new quays will have a target berth length of 560 meters. This is 40 meters

⁴ Aberdeen Harbour (2012), Directions for Growth.

longer than the existing Telford Dock, which is the longest deep water berth in the existing harbour.

The facility will be designed to accommodate the following:

- offshore construction/decommissioning/dive support vessels of up to 145 meters in length;
- platform support vessels in excess of 90m in length;
- cruise vessels;
- liquid bulk vessels – primarily small product carriers of fuels up to 10,000 dwt;
- passenger and vehicle ferries – new generation ferries; and
- general cargo vessels.

It is anticipated that the total cost of the capital works required to develop the new harbour would amount to approximately £320 million. This includes approximately:

- £90 million for new breakwaters;
- £160 million to develop the quayside;
- £50 million for necessary dredging work; and
- £20 million for upgrading the surrounding roads infrastructure.

3.4 Surrounding Industrial Estates

Nigg Bay lies to the north east of two large industrial areas known as Altens and Tullos, both of which currently have somewhat limited roads access. Infrastructure improvements associated with the new harbour could contribute facilitating new industrial development.

Aberdeen City Council identifies four distinct industrial areas that would potentially benefit from improved roads infrastructure associated with the new harbour. These include:

- East Tullos;
- Altens;
- Altens East; and
- Peterseat.

East Tullos is a 63 hectare site located to the south of the existing harbour and was one of the first industrial estates developed in Aberdeen after WWII. Although the site is fully developed it is currently occupied mainly by light industrial users, warehouses and storage yards and has a surprisingly low employment density considering its proximity to the city centre. According to a report published in June 2013⁵, there are also currently eight vacant sites on the estate and consultations with the City Council suggests that many of the existing units are

⁵ Aberdeen City Council (June 2013), Aberdeen Industrial Areas Guide 2013-14.

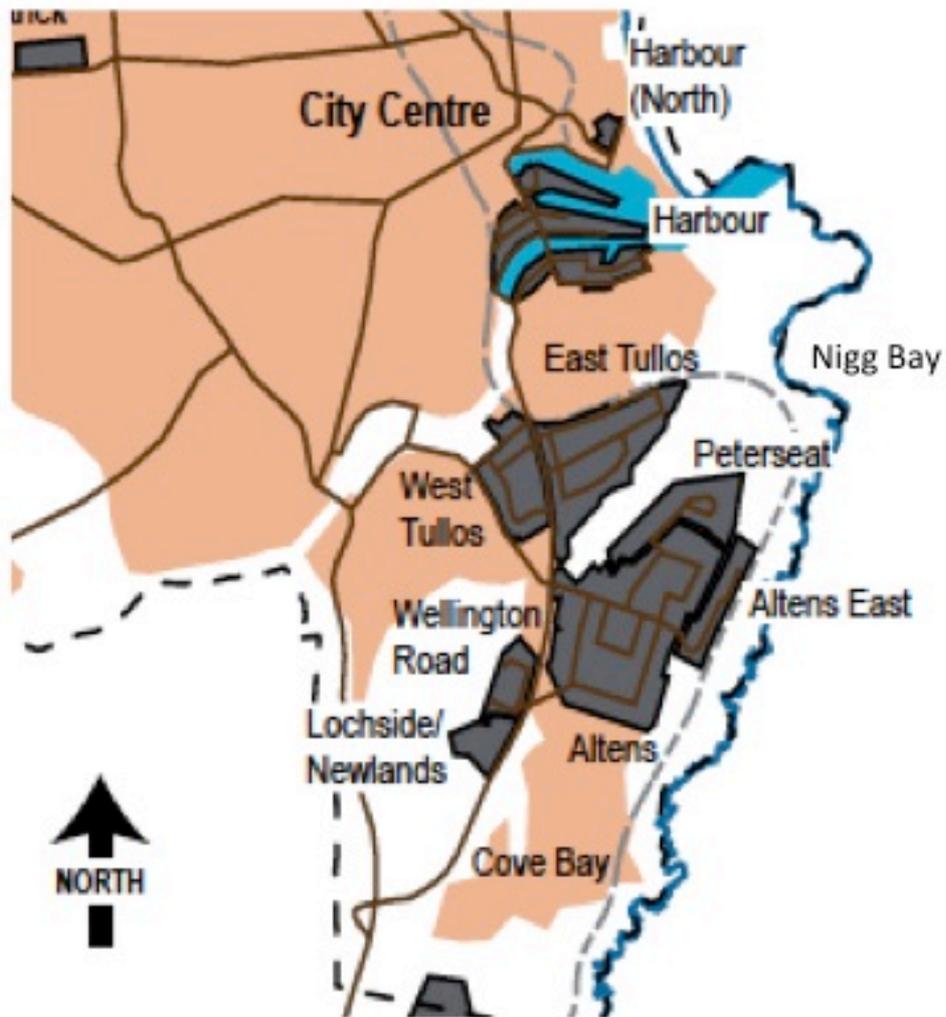
also now quite old and would benefit from upgrading. This is particularly the case for units toward the east of the site, which are less accessible from the main (A956) road. If the accessibility of the site were to be improved as a result of new roads infrastructure associated with a new harbour at Nigg Bay then this could provide an incentive to some owners to improve or redevelop their sites.

The Altens estate is located further to the south of East Tullos. It is a larger and generally more modern site than East Tullos with a slightly higher employment density. Although Altens is also largely full, an employment land audit published in May 2013⁶ shows that there are 0.9 hectares of established but undeveloped industrial land that are available for immediate development. Although this land is not technically constrained from a planning perspective, neither is it currently particularly commercially attractive because of limited accessibility. If the accessibility of the site were to be improved as a result of new roads infrastructure associated with a new harbour at Nigg Bay then this could make these undeveloped sites more commercially attractive to potential investors.

To the north and east of the existing Altens estate there are two further industrial areas known as Altens East and Peterseat, both of which have a significant amount of undeveloped space. According to the recent land audit, Altens East currently has 8.8 hectares of established but undeveloped industrial land, 2.3 hectares of which is constrained by lack of infrastructure. There are also a further 6.9 hectares of land available for immediate development at Peterseat. If the accessibility of these sites were improved by new roads infrastructure associated with developments at Nigg Bay then this could make this undeveloped land more attractive to potential developers. The location of Nigg Bay in relation to these industrial areas is illustrated in Figure 3-1.

⁶ Aberdeen City Council, Aberdeenshire Council and Scottish Enterprise (May 2013), Aberdeen City and Shire Employment Land Audit 2012.

Figure 3-1 – Industrial Areas relevant to Nigg Bay Harbour



Source: Aberdeen City Council Industrial Areas Guide 2013-14.

4 ECONOMIC AND MARKET CONTEXT

This chapter describes the economic and market context for the proposed development of Nigg Bay.

4.1 Economic Context

4.1.1 Population

The population of Aberdeen City and Shire is 468,000, which represents 8.9% of the population of Scotland. The population of Aberdeen City and Shire increased by 30,000 between 2001 and 2011, two thirds of this growth was in Aberdeenshire.

Table 4-1: Population

	Aberdeen City and Shire	Scotland
1991	430,000	5,083,300
2001	438,000	5,064,000
2011	468,000	5,254,800

Source: ONS Mid-year population estimates, 2011

The age breakdown in Aberdeen City and Shire is younger than that of Scotland as a whole. The proportion of people who are over 60 is considerably lower in Aberdeen City and Shire (15.7%) than in Scotland (23.3%). The city of Aberdeen attracts large number of young people through the University of Aberdeen, Robert Gordon University and Aberdeen College. There are 50,000 students at these institutions⁷, equivalent to over a fifth of the city's population.

Table 4-2: Population by age bracket

	Aberdeen City and Shire	Scotland
Under 15	21.0%	16.2%
15 – 29	20.8%	19.8%
30 – 44	21.4%	19.5%
45 – 60	19.9%	21.0%
Over 60	15.7%	23.3%

Source: ONS Mid-year population estimates, 2010

4.1.2 Income

The level of income for full-time workers is around 15% higher in Aberdeen City and Shire than in the rest of Scotland. In 2011, the average (mean) weekly pay for full-time workers in Aberdeen city and shire was £675.42 compared to £584.90 for Scotland. The average weekly pay for female full time workers in Aberdeen City and Shire was £560.12, which is 75% the average pay for male full time workers. This is less than in Scotland as a whole where female full time workers earn 80.0% of male full time workers.

⁷ <http://www.abdn.ac.uk/graduate//general/aberdeen-city/> accessed 06/08/13

Table 4-3: Average (mean) weekly pay – gross (£)

	Aberdeen City and Shire	Scotland
Male Full Time Workers	746.42	638.90
Female Full Time Workers	560.12	508.10
Full Time Workers	675.42	584.90

Source: ONS, *Annual survey of hours and earnings – workplace analysis, 2012*

4.1.3 Labour Force

Both the economic activity and employment rates for those of working age is higher in Aberdeen City and Shire than the rest of Scotland⁸. The economic activity rate in Aberdeen City and Shire is 82.4% and the rate for the whole of Scotland is 76.9%. There are 246,500 individuals employed in Aberdeen City and Shire and this is equivalent to an employment rate of 79.0%. The employment and economic activity rates in Aberdeenshire and Aberdeen City council areas are second and fourth highest of all Scottish councils. The employment rate in Scotland is 70.7%.

Table 4-4: Economic Activity and Employment

	Aberdeen City and Shire	Scotland
Economic Activity Rate	82.4%	76.9%
Employment Rate	79.0%	70.7%

Source: ONS, *Annual survey of hours and earnings – resident analysis, 2011*

In March 2013, 4.2% of the working age population was unemployed in Aberdeen City and Shire. This is 3.8 percentage points below the Scottish unemployment rate of 8.0%. The difference in the unemployment rates is greater. In Aberdeen City and Shire only 2.7 % of the population aged between 18 and 24 claimed Job Seekers Allowance, compared to 8.0% in Scotland as a whole.

Of those who are economically inactive the proportion that are seeking a job in Aberdeen City and Shire (39.8%) is significantly higher than the Scottish proportion (25.4%).

Table 4-5: Unemployment

	Aberdeen City and Shire	Scotland
Unemployment Rate	4.2%	8.0%
Economically inactive who want a job	39.8%	25.4%
18 – 24 year olds claiming JSA (Feb 2013)	2.7%	8.0%

Source: ONS, *Claimant count – age and duration with rates*

4.1.4 Education and Skills

In 2012 the proportion of 16-64 year olds with NVQ4+ qualifications in Aberdeen City and Shire was 40.0% compared to 38.5% for Scotland as a whole. Both have seen an increase in the education level of the working age population in recent years. The proportion of people aged 16-64 with no qualifications is 8.5% in Aberdeen City and Shire and 10.7% in Scotland.

⁸ ONS, *Annual Population Survey, 2012*

Table 4-6: Education, highest qualification of 16 – 64 year olds

	Aberdeen City and Shire		Scotland	
% with NVQ4+	40.0%		38.5%	
% with NVQ3+	61.1%		58.5%	
% with NVQ2+	74.9%		73.1%	
% with NVQ1+	84.6%		83.2%	
% with other qualifications	6.9%		6.1%	
% with no qualifications	8.5%		10.7%	

Source: ONS, Claimant count – annual population survey Jan 2012 – Dec 2012

4.1.5 Industrial Structure

The oil and gas industry is hugely important to the economy of Aberdeen City and Shire. This is shown in the breakdown of industries as % of employment. This shows that 9.8% of the working population are directly employed in the Mining quarrying and utilities sector, four times the Scottish average. The oil and gas sector also has a large support base and supply chain within Aberdeen City and Shire. This is shown in the increased proportion of the workforce employed in Professional, scientific and technical (12.7%) and Manufacturing (8.9%).

The direct employment in the extraction of crude petroleum and natural gas accounts for nearly 7,800 people in Aberdeen City and Shire. As show in Table 4-7 this represents the vast majority of the workers in these industries in Scotland. The support activities for petroleum and natural gas extraction account for a larger proportion of employment and employ over 17,600 people in Aberdeen City and Shire.

Table 4-7: Employment in Oil & Gas

	Aberdeen City & Shire		Scotland	
	Number	%	Number	%
061: Extraction of crude petroleum	7,441	2.7%	7,501	0.3%
062: Extraction of natural gas	334	0.1%	354	0.0%
091: Support activities for petroleum and natural gas extraction	17,633	6.4%	17,838	0.7%

Source: : ONS, Business register and employment survey 2011

This is an underestimate of the economic activity in Aberdeen City and Shire that is supported by the oil and gas industry. A study by Experian for Oil & Gas UK⁹ found that the employment multiplier of the Oil & Gas sector was 7.5. Although only a proportion of the Oil and Gas multiplier will be caught within the Aberdeen City and Shire area, the presence of a well-developed supply chain enables a large proportion to be captured. Aberdeen City Council estimated¹⁰ that 60% of the employment in Aberdeen City and Shire is supported by the direct, supply chain and induced effects of the Oil and Gas industry.

⁹ Oil & Gas UK, *Economic Report 2012*, 2012

¹⁰ Aberdeen City Council, *The Importance of the Energy Sector to Aberdeen City and Shire*, 2010

Employment in the public sector is estimated by summing the employment in Public administration & defence, Health and Education. In this way it can be estimated that the public sector employs 23.5% of the workforce in Aberdeen City and Shire compared to 29.6% across Scotland as a whole. The employment in the all three areas of the public sector is lower in Aberdeen City and Shire, although the difference for Education is not as great due to the presence of the further and higher education institutions in the city.

Table 4-8: Industries (% of employment)

	Aberdeen City and Shire	Scotland
Agriculture, forestry & fishing	0.8%	3.2%
Mining, quarrying & utilities	9.8%	2.6%
Manufacturing	8.9%	7.5%
Construction	5.5%	5.7%
Motor trades	1.5%	1.7%
Wholesale	2.9%	2.9%
Retail	8.5%	10.2%
Transport & storage	4.2%	4.1%
Accommodation & food services	6.5%	7.1%
Information & communication	1.5%	2.4%
Financial & insurance	0.9%	3.5%
Property	1.2%	1.4%
Professional, scientific & technical	12.7%	6.3%
Business administration & support services	8.2%	7.4%
Public administration & defence	4.3%	6.0%
Education	6.4%	7.8%
Health	12.8%	15.8%
Arts, entertainment, recreation & other services	3.6%	4.4%

Source: ONS, Business register and employment survey 2011

4.1.6 Summary of Economic Context

Aberdeen City and Shire is one of the most economically successful areas of Scotland and the UK. Key features of the local economy include:

- 8.9% of the population of Scotland live in Aberdeen City and Shire;
- the mean salary of workers in Aberdeen City and Shire is 15.5% higher than the Scottish mean;
- the employment rate in Aberdeen City and Shire is 3.8 percentage points below the Scottish unemployment rate of 8.0%;
- the level of education in Aberdeen City and Shire is higher than Scotland; and
- the oil and gas sector is vitally important to Aberdeen City and Shire and is responsible for up to 60% of the employment through its direct, indirect and induced operations.

4.2 Market Context

The following section describes trends in markets that are currently important to Aberdeen Harbour or which are expected to be important in the future.

4.2.1 Oil and Gas

The oil and gas sector is a vital industry to Aberdeen City and Shire and the harbour. Ships servicing the industry in the North Sea account for between 65% and 75% of the traffic in and out of the harbour. This is not just service vessels but also trading ships, as companies export oil and gas equipment to nearly 40 countries from Aberdeen Harbour. Consultations with current harbour users suggest that current high levels of activity are expected to either remain the same for the next five years or to increase.

Oil and Gas has had a huge impact on Aberdeen City and Shire in the past four decades. Since the discovery of North Sea oil and gas in the 1960s over 41 billion barrels of oil equivalents (boe) have been extracted from the UK share of these North Sea resources. Although most analysts agree that the majority of the North Sea resources have been extracted the amount remaining is unknown due to difficulties associated with projecting future discoveries. Oil and Gas UK, the industry body for the oil and gas sector estimate that there are between 15 billion and 24 billion barrels of oil equivalent still to be extracted from the North Sea. This implies that between 27% and 37% of the original resource remains to be extracted.

Table 4-9: Estimates of recoverable oil (billion boe)

	Low estimate	High estimate
UKCS Reserves and Resources	15	24

Source: Oil and Gas UK, *Economic Report*, 2012

The United Kingdom Continental Shelf (UKCS) can be split into two main areas. The fields to the northeast of East Anglia are predominantly gas fields and those further north are predominantly oil fields. The majority of the oil fields in the northern North Sea are located near the eastern boundary of the UKCS, near the Norwegian Continental Shelf. This means that the ports that service the oil and gas industry in the Norwegian continental shelf could be viable alternatives to Aberdeen Harbour for ships working in the UKCS. The current levels of interplay between Aberdeen and Norwegian harbours is shown in the fact that shipments between Aberdeen and Norway are more than double the tonnage of any other country.

Evidence from the consultation programme suggests that the cluster effect is very strong in Aberdeen and is considered to be one of Aberdeen Harbour's main advantages over other ports. There was a strong view amongst businesses within the oil and gas sector that it is necessary for suppliers to be close by in order to minimise delays, accidents and to enable problems to be sorted out quickly.

4.2.2 Decommissioning

There are over 600 oil and gas platforms in the North Sea and the market for decommissioning them is expected to be worth £30 - £35 billion between 2010

and 2040¹¹. In the immediate term this market is expected to be worth £4.5 billion between 2012 and 2017¹².

Some of the decommissioning contracts are undertaken offshore, with support vessels, while others such as decontamination and dismantling are based onshore or in shallow waters. Other port authorities such as Lerwick Port have already identified the decommissioning market as a potential opportunity and built specialist decommissioning facilities to help the port to secure business from this market.

The majority of the decommissioning market opportunities will be in the future, however there have been 53 North Sea platforms that have been decommissioned to date¹³. Aberdeen has been involved with these decommissioning projects by providing technical and logistical support. There has also been research and development into methods used for the decommissioning market, such as the project in underwater laser cutting at the University of Aberdeen.

The different phases of the decommissioning process will involve different companies and will be carried out in different locations (see Figure 4-1).

¹¹ Oil & Gas UK, 2012 UK Decommissioning Insight, 2012

¹² Oil & Gas UK, 2012 UK Decommissioning Insight, 2012

¹³ Oil & Gas UK, The decommissioning of steel piled jackets in the North Sea Region, 2012

Figure 4-1 - Phases of the decommissioning process



Source: Oil and Gas UK, *Decommissioning insight*, 2012

Some aspects, such as removal and disposal will require specialist onshore or near shore facilities, such as those developed in Lerwick, at Humberside in England and across the North Sea in Norway. Other aspects of the decommissioning process however will be undertaken offshore and require either air or sea support from suitable onshore locations such as Aberdeen. Based on the Oil and Gas report¹⁴ the total value of the market for these contracts is estimated to be worth up to £27.5 billion between 2010 and 2040.

Consultations with current harbour users suggest that little actual large-scale dismantling of decommissioned platforms is likely to be undertaken in Aberdeen due to space constraints, noise restrictions due to the existing Harbour's city centre location and lack of decontamination facilities. It is however expected that Aberdeen will experience an increase in general activity to service decommissioning traffic such as smaller scale dismantling of offshore structures, subsea related vessels and the import and export of scrap metal. It is also expected that the management of this activity is likely to be undertaken in Aberdeen.

¹⁴ Oil & Gas, 2012 UK Decommissioning Insight, 2012

Table 4-10: Estimates decommissioning costs

	% of total decommissioning	Value to 2040 (£bn)
Preparation for CoP	1%	0.4
Suspension (live)	22%	7
Well abandonment	44%	15.3
Decommissioning and cleaning	5%	1.6
Disconnection	7%	2.6
Suspension cold	0%	0.0
Removal	19%	6.7
Disposal	1%	0.4
Continued liabilities	0%	0.0

Source: Oil and Gas UK, *Decommissioning insight*, 2012

4.2.3 Renewables

Scotland's growing renewable energy sector is a potential source of demand for Aberdeen Harbour. In 2011 the Harbour handled two shipments of onshore wind turbines and blades and demand for logistics infrastructure to service the onshore wind energy developments in the North East is only set to continue.

In 2013 37 onshore wind farms had been consented in Aberdeenshire and Moray, involving a total of 159 turbines¹⁵. There are also a considerable number of wind farm projects in the area that are still in the planning and scoping stages. These projects represent one potential source of demand for the Harbour. There are however many alternative ports in Scotland and it is likely that port facilities and availability are likely to be more important to wind farm developers than minimum transport distances.

There is also set to be increased demand from the offshore renewables sector, both during the initial construction phase and later operations and maintenance. Although Aberdeen was identified in the Scottish Government's National Renewables Infrastructure Plans as a strategically important site, the Harbour is not currently particularly well placed to meet this demand due to the size of components involved and the need for unrestricted quayside access.

Anecdotal evidence from industry suggests that at present, importing large wind turbine large components (blades, towers, nacelles) is not easy at Aberdeen. This is because of the harbour's city centre location, which makes it difficult to transport large components out of the harbour to inland locations and the lack of laydown areas that developers require to store components prior to removal by road. If the development of a new harbour at Nigg Bay helped to resolve these difficulties then the harbour may become more attractive to developers of both on and off shore wind farms.

4.2.4 Tourism

Aberdeen Harbour is an important hub for domestic ferry traffic as it provides the mainland base for the Serco Northlink Ferry services, which serve Orkney and Shetland. The Harbour currently welcomes around 150,000 passengers each

¹⁵ RenewableUK, UK Wind Energy Database, accessed 09/08/13

year. The vast majority of these passengers are traveling to and from Orkney and Shetland but a small proportion are passengers on visiting cruise liners. Although the cruise market currently represents a very small proportion of activity at the Harbour, this is an area where there is potential for future growth. In 2012 nine cruise vessels docked in Aberdeen harbour, the same number as the year before but increased to 13 vessels in.

The cruise market has grown significantly since the turn of the century and that growth is expected to continue into the future. Statistics from Cruise Market Watch¹⁶ show that worldwide the number of passengers increased from 7.2 million in 2000 to 20.3 million in 2012. This is expected to increase to 23.7 million in 2017. Although Scotland constitutes a small segment of the international cruise market, growth in Scotland has been quicker than that in the rest of the world. The number of cruise passengers in Scottish ports increased from 45,000 in 2000 to over 240,000 in 2012¹⁷.

The growth of the cruise market is supported by the growth in both the number and size of cruise ships. It is however expected that the majority of cruise ships in use by 2015 will be too big to dock in Aberdeen Harbour. Cruise Market Watch reports that in 2014-15 a further 13 ships will be added to the global cruise market fleet, with an average passenger number of over 3,000. Only two would have the capacity for fewer than 2,000 passengers and these are being built by operators that do not currently travel to Scotland.

4.2.5 Commercial Property Market

The commercial and industrial property markets in Aberdeen are some of the most competitive in the UK due to demand created by the North Sea oil and gas industry. The latest market trends and data in both of these markets can be found in the Industrial Market Activity Report¹⁸ and the Commercial Market Activity Report¹⁹, prepared by Knight Frank LLP.

In spring 2013 the Commercial Market Activity Report reported that the price of office space in Aberdeen was £31.50 per square foot, which is the highest prime headline rent in the UK outwith London and the South East of England. These high prices have attracted large investment in office capital. The total investment in the office market in 2012 was £203 million, more than double the level in 2011.

The Industrial Market Activity Report shows that the market for industrial property in Aberdeen is also highly competitive. The rate for prime industrial rent in Aberdeen is £8.50 per square foot, which is the highest in the UK outwith the Southeast of England. The rate for good quality second-hand rental space in Aberdeen is £7.50 per square foot, and the gap between prime and second-hand has been narrowing in recent years reflecting the need for companies to take what is available as supply becomes increasingly constrained. The level of rent has been fairly consistent since 2008 and is in line with land values, which are currently £405,000 per acre.

The report found that there were tenants who were unable to find adequate spaces within Aberdeen and were forced to relocate elsewhere due to the lack of supply; however, in 2012 the amount of land that become available for

¹⁶ <http://www.cruisemarketwatch.com/growth/> accessed August 2013

¹⁷ Cruise Scotland, *News Bulletin*, December 2010

¹⁸ Knight Frank LLP, *Winter 2012 Aberdeen: Industrial market activity report, 2012*

¹⁹ Knight Frank LLP, *Spring 2013 Aberdeen: Office market activity report, 2013*

development increased. There are currently over 500 acres of employment land being promoted in Aberdeen City with a value of approximately £200 million.

Since the economic downturn in 2008, there has been very little speculative industrial property development in the UK. Aberdeen has been an exception to this and remains one of the few places where speculative industrial property development does still occur. This provides evidence of the relative strength of the Aberdeen property market in relation to other towns and cities elsewhere in the UK.

5 APPROACH

This section describes the economic impact approach used in this report.

5.1 Sources of Impact

There are six main sources of economic impact associated with Aberdeen Harbour. These are:

- **Aberdeen Harbour Board** – the direct and indirect impacts of Aberdeen Harbour Board including its expenditure on supplies and the expenditure of its staff;
- **other on-site operations** – the direct impact of other businesses located within the Harbour and the indirect impact of the expenditure of their staff;
- **tourism** – the direct and indirect impact of tourism expenditure generated by cruise ships visiting Aberdeen Harbour;
- **off-site logistics** – the direct impact of Harbour related logistics activity based outside the Harbour and the indirect impact of the expenditure of people employed by these businesses;
- **industrial development** – the direct impact of new industrial development associated with the Harbour and of the expenditure of people employed in these developments; and
- **oil and gas** – the direct impact associated with oil and gas activity in Aberdeen City and Shire supported by the Harbour and of the expenditure of employees whose jobs are supported by this activity.

Each of these sources of impact is described and then quantified in the following chapters. Each impact is measured in terms of the value of wealth it creates, measured by gross value added (GVA) and the number of jobs it supports.

5.2 Types of Impact

For each source of impact this report estimates three types of impact:

- **direct impacts** – the employment and GVA directly generated by the business or group of businesses being considered;
- **supplier impacts** – impacts generated elsewhere in the supply chain as a result of purchases made by these businesses; and
- **employee spending impacts** – the effect of employees whose jobs are supported by this activity spending their wages.

For each source of impact the process for estimating direct, supply chain and employee spending effects is the same.

5.2.1 Direct Impacts

The starting point for assessing the direct impact of an activity is the turnover it generates. This is converted into GVA by dividing it by an appropriate turnover/GVA ratio. Where turnover is not available, GVA is calculated by applying an estimate of GVA/employee in relevant sectors to the total employment supported by an activity.

5.2.2 Supply Chain Impacts

The starting point for estimating supplier impacts is the amount spent by an organisation or group of businesses on supplies. The employment impact of this expenditure is calculated by dividing total expenditure by turnover/employee in relevant sector(s). The GVA by these employees is then estimated by multiplying the number of jobs supported by an estimate of GVA/employee in relevant sector(s). Multiplier effects are then captured by applying GVA multipliers for the appropriate sectors to these direct impacts.

5.2.3 Employee Spending Impacts

The starting point for estimating employee spending impacts is the amount of money paid to staff who work in the businesses being considered. In order to calculate how much of the impact of this expenditure occurs within Aberdeen City and Shire it is necessary to make assumptions about where staff live and how much they spend where they live.

Based on previous experience, it is assumed that 75% of staff working in businesses based in Aberdeen live in Aberdeen City and Shire and the rest live somewhere else in Scotland. The amount staff spend in Aberdeen City and Shire will vary depending on where staff live but it is assumed that all staff spend around 70% of their wages somewhere in Scotland (i.e. leakage at the national level is 30%). A summary of these assumptions is provided in Table 5-1.

Table 5-1 – Staff spending assumptions

Staff Location	Staff Spending		
	Aberdeen C&S	Rest of Scotland	Scotland (total)
Aberdeen C&S	35%	35%	70%
Rest Scotland	20%	50%	70%

Source: BiGGAR Economics

To calculate the impact of this expenditure it is first necessary to calculate how much staff spend in Aberdeen City and Shire and how much they spend in Scotland. This expenditure is then divided by average turnover per employee in the relevant area to determine how many jobs it supports. The GVA of this expenditure is calculated by multiplying the number of jobs supported by average GVA/employee in the Scottish (or Aberdeen City and Shire) economy. Average employment and GVA multipliers covering all sectors of the economy are then applied to capture multiplier effects.

5.2.4 Sources

The turnover/GVA ratios and estimates of GVA/employee used in this report are all derived from the 2011 Annual Business Survey published by the Office for National Statistics. The effects of subsequent spending rounds are captured using type II GVA and employment multipliers. These are published in the Scottish Government's input-output tables.

5.2.5 Note on Rounding

Throughout this report jobs impacts have been rounded to the nearest five jobs and GVA impacts are rounded to the nearest whole number.

5.3 Current and Future Impacts

This report considers the current and potential future impact of Aberdeen Harbour in 20 years' time under three development scenarios. These scenarios are:

- the reference case - a new harbour is not developed at Nigg;
- the full development scenario - a new harbour is developed as planned; and
- the basic development scenario – a new harbour is developed but no improvements are made to the surrounding infrastructure.

6 BASELINE ECONOMIC ANALYSIS

The sources of economic impact considered in this report include:

- **Aberdeen Harbour Board** – the direct and indirect impacts of Aberdeen Harbour Board including its expenditure on supplies and the expenditure of its staff;
- **other on-site operations** – the direct impact of other businesses located within the Harbour and the indirect impact of the expenditure of their staff;
- **tourism** – the direct and indirect impact of tourism expenditure generated by cruise ships visiting Aberdeen Harbour;
- **off-site logistics** – the direct impact of Harbour related logistics activity based outside the Harbour and the indirect impact of the expenditure of people employed by these businesses;
- **industrial development** – the direct impact of new industrial development associated with the Harbour and of the expenditure of people employed in these developments; and
- **oil and gas** – the direct impact associated with oil and gas activity in Aberdeen City and Shire supported by the Harbour and of the expenditure of employees whose jobs are supported by this activity.

The current impact from each of these activities is considered below. The potential future impact from each source is then considered in subsequent chapters.

6.1 Aberdeen Harbour Board

The economic impacts of Aberdeen Harbour Board include the direct impacts of operations, impacts associated with the Board's expenditure on supplies, impacts generated by staff expenditure and impacts of construction projects commissioned by the Board. Each of these is considered below.

6.1.1 Direct Impact

Aberdeen Harbour Board directly employs 94 people and in the year ending December 2012 it reported total turnover of more than £27 million. The GVA of this turnover is calculated by subtracting the total value of expenditure on goods and services purchased that year, which amounted to almost £18 million. This gives a net direct GVA impact of almost £10 million.

6.1.2 Supplier Impact

When Aberdeen Harbour Board purchases goods and services this increases the turnover of the Harbour's suppliers and enables them to generate more wealth and employ more people. The vast majority of Aberdeen Harbour Board's regular annual expenditure relates to civil engineering work undertaken to maintain the harbour facilities and dredging. The harbour also purchases services such as facilities management. Relevant sectors therefore include civil engineering, water related construction, coastal freight transport and building services.

Where possible Aberdeen Harbour Board try to maximise local economic impacts by awarding contracts to local suppliers. Based on consultation with the Harbour

Board, it is therefore assumed that 70% of supplies are purchased from businesses located within Aberdeen City and Shire and 90% are purchased from Scottish companies (i.e. leakage at the national level is assumed to be 10%).

In this way it can be estimated that Aberdeen Harbour Board's annual expenditure on goods and services generates a net impact of almost £10 million GVA for the Scottish economy and supports around 110 jobs. In Aberdeen City and Shire this impact amounts to almost £5 million GVA and almost 60 jobs.

6.1.3 Staff Spending Impact

When staff employed by Aberdeen Harbour Board spend their wages this increases the turnover of the businesses that provide them with goods and services. The value of this impact can be calculated by estimating what proportion of staff wages that are spent in Aberdeen City and Shire and elsewhere in Scotland.

In this way it can be estimated that the expenditure of Aberdeen Harbour Board employees contributes a net benefit of more than £3 million to the Scottish economy each year and supports around 45 jobs. In Aberdeen City and Shire this impact amounts to more than £1 million GVA and around 10 jobs.

6.1.4 Construction Impact

In addition to regular maintenance expenditure, the Aberdeen Harbour Board also makes a significant annual investment in new capital projects. In 2012 this expenditure amounted to £21.3 million, much of which was associated with a major project to develop new deep-water berths at the Torry Quay.

This expenditure increases the turnover of the appointed contractors, generating wealth and supporting employment in Scotland and beyond. Due to legal requirements related to the scale of the projects, many of these contracts are awarded to contractors outside Aberdeen City and Shire and some are awarded to firms based outside Scotland. Analysis of information provided by Aberdeen Harbour suggests that around 10% of construction related expenditure benefits firms based in Aberdeen City and Shire and around two thirds benefits Scottish Firms (i.e. at the national level leakage is around one third).

The employment impact of this expenditure can be calculated by dividing total expenditure in each area by turnover/employee in relevant sub-sectors of the construction sector. The GVA impact can then be calculated by multiplying the number of jobs directly supported by GVA/employee in the same sub-sectors. Appropriate GVA and employment multipliers can then be applied to capture the effect of subsequent spending rounds.

In this way it can be estimated that in 2012 major capital projects undertaken by Aberdeen Harbour contributed a net benefit of almost £11 million GVA to the Scottish economy of which £1 million GVA was retained within Aberdeen City and Shire. It can also be estimated that these projects supported almost 180 Scottish jobs in 2012, including almost 20 in Aberdeen City and Shire.

6.1.5 Aberdeen Harbour Board Summary

In 2012 the activities of the Aberdeen Harbour Board contributed almost £23 million GVA to the Scottish economy and supported 252 jobs. In Aberdeen City and Shire this amounted to a net benefit of £16 million and around 160 jobs. In addition, the construction related expenditure of Aberdeen Harbour contributed a net benefit of almost £11 million GVA to the Scottish economy and supported

almost 180 years of employment²⁰, of which £1 million GVA and almost 20 years of employment were in Aberdeen City and Shire. These impacts are summarised in Table 6-1.

Table 6-1 – net economic impact of Aberdeen Harbour Board – 2012*

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Direct	94	10	94	10
Supplier	57	5	112	10
Staff spending	10	1	46	3
Total (excluding construction)	161	16	252	23
Construction	17	1	178	11

Source: BIGGAR Economics economic impact model. *numbers may not sum due to rounding.

6.2 Other On-site Operations

Aberdeen Harbour Board is only one of a large number of businesses based on the Harbour site. Although these businesses operate independently of the Harbour Board, being located close to the Harbour is critical to most of them so it is reasonable to include the impact of their activities.

6.2.1 Employment in On-site Operations

Aberdeen is the main hub of the Scottish oil and gas sector and Aberdeen Harbour is the focus for much of this activity. The Harbour hosts a well developed cluster of oil and gas related companies. This includes both companies that are directly involved in the extraction of oil and gas (such as BP, Total and Shell) and those that provide goods and services to the sector such as logistics specialists, waste disposal experts and training providers. Other types of businesses located at the Harbour include:

- businesses engaged in the distribution of cargo entering or leaving the port (e.g. Omya UK Ltd);
- Serco NorthLink Ferries, which provides freight and passenger transport services between Orkney, Shetland and the Scottish mainland;
- ships agents; and
- haulage companies.

The starting point for estimating the economic impact of these companies is to establish how many people they employ. This was done through consultation with Aberdeen Harbour Board, interviews with some of the largest tenants and a review of information on company websites. These estimates are presented below.

²⁰ As construction related employment is temporary, the employment impact of construction projects is measured in terms of job years rather than jobs with one job year equivalent to one person being employed full time for a year.

Table 6-2 - Estimated employment in selected on-site businesses

Company	Estimated employment	Company	Estimated employment
Asco UK Ltd	284	Caledonian Oils	30
Serco Northlink Ltd	145	BP & Total	12
NOV Brandt	22	Shell & TAQA	6
Peterson Ltd	267	Nord Centre (includes several companies)	200
Streamline Shipping Agencies Ltd	50	Agents (assumed 20 agents, each employing 15 people.	300
Dales Properties (Scotland) Limited	105	Waste recycling	10
M-I Drilling Fluids U.K Ltd	50	Euroline	6
Petrofac Training Services	18	C-Mar Global Solutions Ltd	53
ARR Craib Transport Ltd	50	Omya UK Ltd	18
		GAC	25
Total		1,651	

Source: BIGGAR Economics estimates based on consultation with Aberdeen Harbour, selected tenants and company websites.

Although the businesses identified in Table 6-2 are amongst the largest businesses operating at the Harbour, the list is not comprehensive and excludes numerous smaller operations. It is estimated that these smaller businesses account for 5% of total on-site employment. It is therefore estimated that direct on-site employment is around 1,735.

6.2.2 Direct Impact

The direct impact of on-site operations can be calculated by multiplying the direct employment in each of the businesses listed above by an estimate of GVA/employee in the sector in which it operates. Total GVA was then inflated by 5% to account for businesses not identified in Table 6-2. In this way it can be estimated that the total net direct GVA impact of on-site businesses amounts to around £297 million.

6.2.3 Supplier Impact

Most of the businesses located at Aberdeen Harbour are part of the oil and gas supply chain. The impact of the oil and gas supply chain is considered as part of section 6.5 and is therefore omitted here to avoid double counting.

6.2.4 Staff Spending Impact

The starting point for estimating the impact of the expenditure of people who work at Aberdeen Harbour is to estimate the total value of wages paid to people who work there each year. This is done by multiplying the total number of employees by an estimate of the average annual income of workers in Aberdeen City, which is currently a little over £37,000 per year.

In this way it can be estimated that the expenditure of employees working at Aberdeen Harbour contribute a net benefit of more than £32 GVA million to the Scottish economy each year and support more than 467 jobs. In Aberdeen City and Shire this impact amounts to more than £14 million GVA and around 105 jobs.

6.2.5 Other On-site Operations Summary

Each year the activities of businesses located at Aberdeen Harbour contribute £329 million GVA to the Scottish economy and supports around 2,200 jobs. In Aberdeen City and Shire this impact amounts to around £311 million GVA and around 1,835 jobs. These impacts are summarised in Table 6-3.

Table 6-3 – net economic impact of businesses located at Aberdeen Harbour

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Direct	1,735	297	1,735	297
Staff spending	105	14	467	32
Total	1,835	311	2,200	329

Source: BiGGAR Economics economic impact model

6.3 Tourism

Each year Aberdeen Harbour welcomes a growing number of cruise ships. When these ships berth in Aberdeen, expenditure by passengers and crew and supplies purchased for the ship all help to generate economic activity in the Aberdeen City and Shire economy. This section quantifies this impact.

6.3.1 Tourism Related Activity

There are two main sources of economic impact associated with cruise tourism. The first is expenditure by passengers and ships crew in Aberdeen when the ship is berthed at the Harbour and the second is associated with purchases made by the ships operators on supplies for the ship.

The starting point for estimating these impacts is the total number of cruise passengers arriving at Aberdeen each year. In 2012 Aberdeen Harbour welcomed 1,434 passengers. This is a relatively small number and reflects the fact that the cruise ships currently using Aberdeen Harbour tend to be fairly small by the standards of the industry.

The largest cruise ship that has visited Aberdeen Harbour is MS Europa, which has the capacity to carry 408 passengers, but most are considerably smaller than this with an average capacity in 2013 of just 95 passengers. The volume of current cruise liner activity at Aberdeen Harbour is such that the impact of this expenditure is likely to be very small but the impact is considered here because this is an area with considerable potential for future growth.

In 2012 Aberdeen Harbour welcomed just nine cruise liners but during 2013, this had increased to 13 vessels. The average size of cruise liners is expected to increase substantially in the future and the Nigg Bay expansion would enable Aberdeen Harbour to cater for these larger vessels. This means that if the development goes ahead, the harbour will have the potential to substantially increase its tourism impact.

6.3.2 Tourism Related Expenditure

The starting point for calculating the current tourism impact is to estimate how much additional expenditure is generated by cruise related expenditure. This can be done by multiplying the number of cruise passengers by an estimate of average expenditure per passenger, which is taken from recent research²¹ relating to cruise activity at the Port of Leith.

The next step is to consider what type of goods this expenditure might be spent on. Cruise passengers and crew will eat most of their meals on board the ship so any expenditure ashore will tend to be on things like shore excursions, retail purchases of clothing, jewellery and local crafts and souvenirs. Purchases of supplies for the ship will be mainly fresh food.

It is then necessary to estimate how much of this expenditure might be retained within Aberdeen City and Shire. Cruise passengers and crew have limited time available to spend ashore so it is assumed that the vast majority (90%) of their expenditure will be retained within Aberdeen City and Shire. As operators are able to arrange delivery of fresh food prior to arrival geography will be less of a constraint for this impact so it is assumed that 75% of supplies are purchased from businesses based in Aberdeen City and Shire.

The employment supported by the expenditure of passengers and crew can be estimated by dividing the total value of expenditure by an estimate of turnover/employee in the retail sector. Employment supported by expenditure on ships supplies can be estimated by dividing the total value of expenditure by an estimate of turnover/employee in the wholesale food sector.

The GVA impact associated with this expenditure can then be calculated by multiplying the employment supported in each sector by an estimate of average GVA/employee in each sector. The effects of subsequent spending rounds can then be captured by applying appropriate multipliers for these sectors.

In this way it can be estimated that expenditure associated with cruise liners currently contributes less than £100,000 GVA to the Scottish economy each year and supports around one job. Although small, this impact is included here because of its future potential.

6.4 Off-Site Logistics

The activity undertaken at the harbour also generates a significant volume of activity off-site associated with the storage and transportation of cargo to and from the port. This section considers the impact of this activity.

6.4.1 Employment in Off-site Logistics

The two main logistics providers at the Harbour are Perterson Ltd and Asco, both of which have substantial on-site operations. Although the direct employment associated with these operations is included as part of the on-site operational impact calculated above any additional employment supported off-site by these companies and similar operators is not. In particular, the on-site impact does not include any employment in warehouses operated (or used) by these companies elsewhere in Aberdeen

²¹ GP Wild International Ltd (August 2012), a study of cruise tourism demand at the Port of Leith.

Consultation with Euroline, one of the shipping agents located at the Harbour, confirms that the scale of this off-site activity is likely to be significant. Euroline currently directly employ 6 people on-site but estimate that their activity supports employment in excess of 100 sub-contractors elsewhere in the supply chain. The type of activities that are sub-contracted include truck drivers, crane operators and other ancillary services.

Euroline provided an estimate of the total volume of cargo they handle each year and the total amount of off-site logistics staff this supports. By applying this to the total volume of cargo that passed through Aberdeen Harbour in 2012, it can be estimated that a total of 2,570 logistics staff are currently required to support harbour operations.

As some of the logistics companies are based on-site, some of this employment has already been counted in section 6.2. Based on consultations with the Harbour Board and some of the businesses located at the Harbour it is estimated that around 1,100 of these staff are located on-site. To avoid double counting, only the impact of the 1,470 logistics jobs located off-site is estimated in this section.

6.4.2 Direct Impact

The net direct GVA impact of off-site logistics can be calculated by multiplying the total additional logistics jobs supported by an estimate of GVA/employee in the road freight transport and warehousing sectors. This gives a direct GVA impact of around £160 million.

6.4.3 Supplier Impacts

Most of the logistics support associated with Aberdeen Harbour is part of the oil and gas supply chain. The impact of the oil and gas supply chain is considered as part of section 6.5 and is therefore omitted here to avoid double counting.

6.4.4 Staff Spending Impact

The starting point for estimating this impact is to estimate the total value of wages paid to off-site logistics staff each year. This is done by multiplying the total number of employees by £28,600, which is the average annual income of workers in the transportation and storage sector according to the Annual Survey of Hours and Earnings.

From this it can be estimated that the expenditure of off-site logistics employees supported by Aberdeen Harbour contributes a net benefit of more than £21 million to the Scottish economy each year and supports around 305 jobs. In Aberdeen City and Shire this impact amounts to almost £9 million GVA and 65 jobs.

6.4.5 Off-Site Logistics Summary

Each year the activities of off-site logistics companies that service Aberdeen Harbour contribute a net benefit of over £181 GVA to the Scottish economy and supported around 1,770 jobs. In Aberdeen City and Shire this impact amounted to almost £169 million GVA and around 1,535 jobs. These impacts are summarised in Table 6-4.

Table 6-4 – net economic impact of off-site logistics providers

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Direct	1,470	160	1,470	160
Staff spending	65	9	305	21
Total	1,535	169	1,770	181

Source: BIGGAR Economics economic impact model

6.5 Industrial Development

If a new harbour is constructed at Nigg Bay it is expected that this will help to encourage development on surrounding industrial estates. As discussed in section 3.4, there are four industrial estates close to Nigg Bay with future growth potential. Between them Altens East, Altens and Peterseat have 14.3 hectares of land that is immediately available for development. East Tullos has no available land but there is significant scope for some of the plots to be upgraded, which could result in an increase in employment density.

6.5.1 Direct Impact

The starting point for estimating the direct economic impact of this development is to estimating the number of additional jobs that could be created as a result of any new industrial development. The economic impact of these jobs can then be estimated by multiplying the total number of additional jobs supported by an estimate of GVA/employee in the Aberdeen City and Shire economy.

6.5.2 Supplier Impacts

It is likely that most of the new jobs created in the industrial estates would be either directly or indirectly involved in the oil and gas supply chain. The impact of the oil and gas supply chain is considered as part of section 6.6 and is therefore omitted here to avoid double counting.

6.5.3 Staff Spending Impact

The starting point for estimating this impact is to estimate the total value of wages paid to staff working in the industrial space each year. This is done by multiplying the total number of employees by £37,268, which is the average annual income of people working in Aberdeen City according to the Annual Survey of Hours and Earnings.

6.5.4 Industrial Development Summary

The development of new and existing land around Nigg Bay has not yet occurred so the current impact of this is zero.

6.6 Wider Oil and Gas Sector Impacts

The discovery of oil reserves in the North Sea in the late 1960s led to a rapid transformation of the economy of Aberdeen City and Shire. Since then, around 40 billion barrels of oil equivalent (boe) has been recovered and the energy sector has become a defining part of the local economic landscape. By most standard measures of success the Aberdeen City and Shire is amongst the most

prosperous regions of the UK (see section 4.1). Much of this prosperity is directly attributable to the oil and gas sector.

While the existence of the sector cannot be attributed to Aberdeen Harbour, the port has played an important role in enabling the sector to develop in the way that it has. Aberdeen Harbour has been at the heart of the Scottish oil and gas industry since the late 1960s and it is estimated that between 65% and 75% of current activity at the harbour is oil and gas related. Consultations with major oil and gas corporations undertaken to support this study confirm that the Harbour continues to be regarded as extremely important to the continued success of the sector.

It is of course impossible to accurately assess what Scotland's oil and gas sector might look like today if Aberdeen Harbour did not exist but it is difficult to imagine that the concentration of oil and gas related activity that currently exists in and around the city would have developed to the same extent without the Harbour. If the sector had been unable to develop this concentration then this would undoubtedly have impacted on its competitiveness. This may have resulted in the sector being smaller than it currently is and/or in some of the activity that is currently undertaken in Scotland being undertaken in England or overseas instead.

For this reason it is reasonable to include some of the economic impact generated by the sector within this assessment. How much of the impact of the oil and gas sector should be included within this assessment is necessarily a matter of judgement. The Harbour is not the only reason that Aberdeen has become such a hub for the oil and gas sector. Other factors such as Aberdeen Airport, Aberdeen's proximity to North Sea oil fields and the skills profile of the local labour market have all also been important.

If it were assumed that each of these factors were equally important then one approach would be to include 25% of the impact of the sector in this assessment. This would however risk ignoring other important factors that may have influenced the development of the sector. It is impossible to know exactly what these may be so a more conservative assumption of 10% has therefore been adopted.

6.6.1 Direct Impact of Oil and Gas Sector

The starting point for estimating the impact of the oil and gas sector that is attributable to the Harbour is the number of people who are directly employed in the sector. Using data published by Oil and Gas UK it can be estimated that in 2013 just over 70,000 people are employed in the oil and gas sector in Aberdeen City and Shire or in the associated supply chain.

As discussed above, 10% of these jobs (just over 7,000) are included within this assessment. The next step is to exclude oil and gas jobs that have already counted as part of the on-site impact calculated in section above, which leaves around 5,590 jobs.

The net GVA impact of these jobs can be calculated by multiplying the number of jobs by an estimate of the GVA/employee for employees working in the sector. This gives a GVA impact of more than £851 million.

6.6.2 Supplier Impacts

The direct impact described above includes employment supported in the oil and gas supply chain. It is therefore unnecessary to calculate supply chain impacts separately.

6.6.3 Employee Spending Impacts

The starting point for estimating this impact is to estimate the total value of wages paid to these staff each year. This is done by multiplying the total number of employees by £53,484, which is the weighted average annual income of workers in the oil and gas extraction sector and supporting industries derived from the Annual Survey of Hours and Earnings.

In this way it can be estimated that the expenditure of these employees contributes a net benefit of almost £151 million to the Scottish economy each year and supports almost 2,270 jobs. In Aberdeen City and Shire this impact amounts to almost £56 million GVA and around 425 jobs.

6.6.4 Summary Oil and Gas Sector Impacts

Activity in the oil and gas sector in Aberdeen City and Shire that can be attributed to the Harbour contributes a net benefit of almost £2,359 million GVA to the Scottish economy and supports almost 7,860 jobs. Included within this is almost £2,264 million GVA and almost 6,015 jobs within the Aberdeen City and Shire economy. These impacts are summarised in Table 6-5.

Table 6-5 – net economic impact of oil and gas sector employment attributable to Aberdeen Harbour

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Direct	5,590	851	5,590	851
Staff spending	425	56	2,265	151
Total	6,015	907	7,860	1,002

Source: BiGGAR Economics economic impact model

6.7 Summary of Current Impact

Taken together the impacts described in this chapter amount to a net annual economic contribution of almost £1.5 billion in Scotland, most of which is retained in Aberdeen City and Shire. It is also estimated that Aberdeen Harbour supports around 12,080 jobs across Scotland, of which around 9,550 are in Aberdeen City and Shire. These impacts are summarised in Table 6-6, which breaks-down the total impact into impacts that are generated on-site and impacts that are generated off-site.

Table 6-6 – net economic impact of businesses located at Aberdeen Harbour

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Aberdeen Harbour Board	161	16	250	23
Other on-site operations	1,835	311	2,200	329
Tourism	1	<0.1m	1	<0.1m
<i>Total on-site impact</i>	<i>2,000</i>	<i>327</i>	<i>2,455</i>	<i>352</i>
Off-site logistics	1,535	169	1,770	181
Industrial development	n/a	n/a	n/a	n/a
Oil and gas sector	6,015	907	7,860	1,002
<i>Total off-site impact</i>	<i>7,550</i>	<i>1,077</i>	<i>9,630</i>	<i>1,184</i>
Total impact	9,550	1,403	12,080	1,536

Source: BIGGAR Economics economic impact model

6.7.1 Impact by Source

Figure 6-1 present a break-down of the current employment impact (top) and GVA impact (bottom) of Aberdeen Harbour by source in Aberdeen City and Shire and in Scotland. The profile of each of the impacts is broadly similar. Almost two thirds of the impact is due to the Harbour’s role in supporting the oil and gas sector. Approximately a further fifth is attributable to other on-site operations and between 12% and 16% is due to off-site logistics. In each case the activity of Aberdeen Harbour Board its self and the impact of on-site tourism activity is negligible, accounting for between 1% and 2%.

Figure 6-1 - Employment currently supported by Aberdeen Harbour by source of impact



7 ASSUMPTIONS ABOUT FUTURE DEVELOPMENT

The objective of this report is to consider what the impact of Aberdeen Harbour might be in the future. To do this it is necessary to make assumptions about how activity associated with the Harbour might change. This section describes these assumptions.

7.1 Aberdeen Harbour Board

This section considers what the impact of Aberdeen Harbour Board might be in 20 years' time under the three development scenarios.

If the development of Nigg Bay does not happen the Harbour anticipates that employment will remain at current levels so the direct employment impact will remain unchanged at 94 jobs. There will however be a gradual decline in revenue from harbour activities, which is expected to start in around five years and result in revenues being around 4% lower in 20 years' time than they are at present.

If the new harbour is developed, then Aberdeen Harbour Board expect to employ an additional four people and revenue from harbour activities are expected to increase by 41% to £23.2 million by year 20. Aberdeen Harbour Board's expectations about future activity and the revenue this will generate are based on the assumption that the roads infrastructure around the new harbour will be improved. If this does not happen then it will be more difficult for expected levels of growth to be realised. The location of Nigg Bay to the south of the city and clear of Market Street will also make it a preferred option for some oil and gas sector companies.

Consultation with the Harbour and harbour users suggests that if the roads infrastructure around the site is not improved this is unlikely to deter harbour users from increasing activity on the site but it will make it more difficult for them to do so. In effect it will mean that users might delay planned investments and development will take longer to realise. This is modelled by assuming that in the basic development scenario anticipated growth starts around five years later than anticipated and that revenue from harbour activities peaks in year 15.

At present harbour revenues represent 64% of total turnover and the Harbour Board spends approximately 64% of turnover on supplies. It is assumed that these proportions will not change in the future. These assumptions can be used to estimate the future turnover of the Harbour and its future expenditure on supplies, both of which are necessary to estimate future GVA impact.

The assumptions used to estimate the future impact of Aberdeen Harbour Board are summarised in Table 7-1.

Table 7-1 – On-site activity assumptions

Assumption	Reference Case	Basic Development Scenario	Full Development Scenario
Total employment by year 20	94	98	98
Revenue from activities by year 20	£16.5 million	£23.2 million	£23.2 million
Year change starts	Year 5	Year 5	Year 1
Year change fully realised	Year 18	Year 15	Year 11

Source: BIGGAR Economics economic impact model

7.1.1 Gross to Net Impact

The proposals to develop a new harbour at Nigg Bay would be in addition to rather than as a replacement of existing operations so no displacement will occur. The Harbour Board is progressing these proposals in response to market demand and potential incentives from the public sector have not been a factor in the decision making process. This means that there will be no substitution effect.

7.2 On-site Operations

The future impacts of other on-site operations will be driven by the number of employees working on-site in 20 years' time, which will in turn be driven by the rate of growth experienced by on-site businesses between now and then.

The majority of businesses consulted for this study were optimistic about prospects for future business growth but the extent to which users will be able to achieve this will depend largely on whether they have access to the facilities and services they require. At present this is often not the case.

The majority of businesses consulted (12 out of 17) for this report indicated that their current activities were either already constrained to some extent by the availability of services or facilities at Harbour or could become so in the near future. The main constraint mentioned was the lack of space at the existing harbour and the delays that this causes for ships entering the harbour. Of the five businesses that do not experience constraints, three either already use other ports on the east coast or would consider doing so if Aberdeen became too constrained and one has its own berths and quayside facilities.

The time-scale considered by most of these businesses was around five years. After this, expectations became much more uncertain. The main growth driver for the vast majority of these businesses is the price of oil so it is reasonable to expect that growth in current markets will broadly reflect activity in the wider oil and gas sector. As discussed in section 6.5, it is expected that employment in the oil and gas sector will decline by around 20% over the next 20 years. This suggests that in the longer term, activity amongst existing users may decline by up to 20%, although this should be considered a worst-case scenario and the large scale decommissioning of offshore infrastructure required may keep employment in some sectors at current levels.

At least two of the businesses consulted confirmed that they are already experiencing a slight decline in demand from the oil and gas sector and are beginning to look at the renewables market as an alternative source of future

growth. In the medium to long term (10 years plus) it is reasonable to expect that more businesses will have a similar experience and that over time some of the current demand from the oil and gas sector will be replaced by other markets.

Over a 20 year period, this suggests that, unless additional facilities are provided, many current users will be unable to achieve anticipated levels of growth in the short-term or make the transition into new markets in the longer term. This would be consistent with Aberdeen Harbour Board's expectation that if a new harbour is not developed at Nigg Bay then revenue from harbour activities will decline by around 4% over the next 20 years. It is therefore assumed that if a new harbour is not developed then employment within on-site companies will be 4% lower in 20 years than it is today.

Although most of the businesses consulted for this project were not able to quantify future growth expectations, those that could were optimistic about the future. One business that was able to quantify growth expectations suggested that they expect growth of around 30% per year for the next five years, based from a current turnover of around £9 million and more than 20 employees. Another business that was able to quantify growth is expecting around 30% growth over the next couple of years.

Developing a new harbour at Nigg is expected to be very important to helping businesses to realise these expectations. This is not to say that individual businesses will not grow if the new Harbour is not developed, but rather that capacity constraints within the Harbour will mean that growth within one company is likely to be offset by a decline in another. Developing the new harbour should enable all businesses that expect to grow to realise their aspirations.

Aberdeen Harbour Board expects that if a new harbour is developed at Nigg Bay as proposed, then revenues from harbour activities will increase by around 41% over the next 20 years. It is reasonable to assume that harbour revenues are broadly proportionate to the level of activity amongst Harbour users so it is assumed that if the Harbour is developed as planned, employment amongst existing users will increase by around 41% over the next 20 years. This would be broadly consistent with the expectations of the two businesses that were able to quantify future growth aspirations.

If a new harbour is developed but no improvements are made to the surrounding infrastructure, this is expected to make it more difficult for harbour users to realise their growth aspirations. Although users are still expected to achieve the same level of growth, it is expected that this will take longer to achieve. This is modelled by assuming that under the full development scenario growth begins in year 5 and is fully realised by year 15 but under the basic development scenario, growth begins in year 10 and is fully realised by year 20.

The assumptions used to estimate the future impact of on-site activities are summarised below.

Table 7-2 – On-site activity assumptions

Assumption	Reference Case	Basic Development Scenario	Full Development Scenario
Total growth in activity by year 20	-4%	+41%	+41%
Year growth starts	Year 1	Year 5	Year 1
Year change realised	Year 5	Year 15	Year 10

Source: BIGGAR Economics economic impact model

7.2.1 Gross to Net Impact

At a Scottish level there are a number of ports that could potentially accommodate some of this activity including Nigg (north of Inverness), Invergordon or Montrose. Anecdotal evidence from consultees suggests that demand for space at these ports is also high so it is likely that displacement would be low. At the Aberdeen City and Shire level, the only port that could potentially accommodate any of this demand is Peterhead but its capacity to do so is likely to be limited so displacement would be lower than the Scottish level.

It is therefore assumed that displacement at the Scottish level would be 25% at the Scottish level and 10% at the Aberdeen City and Shire level. If the harbour is developed without improvements to surrounding roads infrastructure then it will be somewhat less attractive as an investment location so it is also assumed that displacement under the basic development scenario will be lower, i.e. 10% at the Scottish level and 5% at the Aberdeen City and Shire level.

7.3 Future Tourism Development Assumptions

It is assumed that even if Nigg Bay is not developed, the modest level of current activity will be maintained and that in 20 years' time the Harbour will be welcoming around 15 cruise ships per year. It is assumed that the size of these ships will be similar to that of the ships that currently use the harbour, which in 2013 carried an average of 95 passengers.

Aberdeen Harbour Board expects that the new harbour at Nigg will enable it to attract between 30 and 40 cruise ships each year. The new harbour will also enable much larger ships to visit.

If a new harbour is built and improvements are made to surrounding roads infrastructure then this may make the harbour a more attractive destination for visiting ships. For example road improvements may make it easier for coaches to access to the quayside, which would make it easier for cruise companies to organise excursions for passengers. The additional space may even make it possible to create dedicated visitor reception facilities.

It is therefore assumed that under the full development scenario, the number of ships visiting Aberdeen Harbour in the future would be around 40, toward the top of the range of expectations. Under the basic development scenario it is assumed that the level of growth realised will be toward the bottom end of the range, which would equate to around 30 ships per year.

For both development scenarios it is assumed that 15 of the ships would be of a similar size to the ships that currently visit the Harbour and the rest would be much larger ships, with a capacity of up to 3,000 passengers.

The assumptions used to model future tourism impacts are summarised in Table 7-5.

Table 7-3 – Tourism development assumptions

Reference Case	Basic Development Scenario	Full Development Scenario
Harbour attracts 15 cruise ships per year carrying an average of 95 passengers each.	Harbour attracts 30 cruise ships per year 15 of which carry an average of 95 passengers and 15 of which carry an average of up to 3,000 passengers.	Harbour attracts 40 cruise ships per year 15 of which carry an average of 95 passengers and 15 of which carry an average of up to 3,000 passengers.

Source: BiGGAR Economics economic impact model

7.3.1 Gross to Net Impact

If a new harbour is developed at Nigg Bay it is possible that some of the cruise ships that visit the Harbour in the future might otherwise have visited other Scottish ports so displacement could be an issue at the Scottish level. Displacement will not occur at the Aberdeen City and Shire level because there are no other ports within the region that could accommodate large cruise ships.

If improvements are not made to the surrounding roads infrastructure then it is unlikely that Aberdeen would be a sufficiently attractive destination to attract cruise liners away from other Scottish ports so displacement is unlikely to be an issue in the basic development scenario. In the full development scenario it is assumed that this effect will be small (10%) because of the overall level of growth in the global cruise market.

Cruise liner activity will depend on global market demand for this type of holiday, which will not be influenced by public sector incentives so there will be no substitution effect.

7.4 Off-site Logistics

The future impact of off-site logistics will be driven by the volume of cargo that will go through the Harbour in the future. In 2012 the Harbour Board received £6.9 million in harbour dues on 5.1 million tonnes of cargo, equating to £1.34 per tonne. If it is assumed that this ratio will not change in the future then it is possible to estimate how much cargo will pass through the Harbour in the future based on the value of harbour dues that the Aberdeen Harbour Board expects to receive in the future.

If the new Harbour does not go ahead then in 20 years' time Aberdeen Harbour Board expect to receive around £6 million per year in dues on goods, which implies that around 4.5 million tonnes of cargo will be passing through the Harbour each year. Using the approach described above, it can be estimated that this volume of cargo would support employment for 2,237 people.

If the new harbour does go ahead, it is expected that in 20 years' time dues on goods passing through the Harbour will be worth around £8.5 million. This implies that around 6.3 million tonnes of cargo will pass through the Harbour by year 20, which would support around 3,170 jobs.

Off-site logistics activity is closely linked to on-site harbour operations so it is reasonable to expect that growth amongst the two groups of businesses will be similar. As discussed in above, if a new harbour is developed but the surrounding

roads infrastructure is not improved, on-site businesses will find it more difficult to realise their growth expectations. The effect of this is likely to be that it will take longer for expected levels of growth to occur. This is modelled by assuming that under the basic development scenario, growth in off-site logistics starts five years later than expected.

At present around 57% of logistics employment supported by the Harbour is based off-site. It is assumed that this will not change in the future.

These assumptions are summarised in Table 7-4

Table 7-4 – Oil and gas sector assumptions

Assumption	Reference Case	Basic Development Scenario	Full Development Scenario
Annual Cargo	4.5 million tonnes	6 million tonnes	6 million tonnes
Total gross logistics jobs (approx.)	2,250	3,150	3,150
Gross off-site logistics jobs (approx.)	1,280	1,810	1,810
Year growth starts	n/a	Year 1	Year 5

Source: BIGGAR Economics economic impact model

7.4.1 Gross to Net Impact

Off-site logistics activity will be closely linked to on-site harbour operations so the same assumptions about displacement and substitution are adopted for this impact as were used for the on-site harbour operations impact. That is 25% at the Scottish level and 10% at the Aberdeen City and Shire level for the full development scenario and 10% at the Scottish level and 5% at the Aberdeen City and Shire level for the basic development scenario.

7.5 Industrial Development

The starting point for calculating this impact was to estimate how many people are currently employed on the East Tullos Industrial Estate. This was done using Information about the size of each site on the Estate from Aberdeen City Council²² and assumptions about the current use of each site, which were obtained by reviewing each site on Google Earth. Once the size and use of each plot was identified, an estimate of how many people are employed on each plot was made by applying an appropriate employment density assumption, which was obtained from guidance produced by the Homes and Communities Agency²³. Using these assumptions it can be estimated that there are currently between 5,600 and 5,700 people employed on the East Tullos industrial estate.

Several of the sites at East Tullos are currently vacant. Given the existing level of demand for industrial space in Aberdeen it is assumed that all of these sites will be occupied in 20 years' time even if the new harbour at Nigg Bay does not go ahead. It is assumed that they will be occupied to similar users and for similar purposes to the rest of the site at present. In this way it can be estimated that

²² Aberdeen City Council (June 2013), Aberdeen Industrial Areas Guide 2013-14.

²³ Homes and Communities Agency (2010), Employment Densities Guide.

approximately 200 more people might be working on the East Tullos industrial estate in 20 years' time even if the new harbour does not go ahead.

It is expected that the new harbour will increase demand for existing industrial space, regardless of whether the surrounding roads infrastructure is improved or not. This is modelled by assuming that the density of existing land use at East Tullos will increase by 10% over the next 20 years.

If improvements are made to the surrounding roads infrastructure however, this will improve the accessibility of the industrial land and make it more valuable to potential occupiers. This is likely to provide an incentive to owners to improve or redevelop their sites. The effect of this is modelled by assuming that new offices, are built on each of the currently vacant sites.

Each of the other three industrial estates (Altens, Altens East and Peterseat) currently have further space available for development. Demand for industrial space in Aberdeen is generally buoyant so it is assumed that all unconstrained space that is available at the other three estates will be developed at some point over the next 20 years. It is however assumed that the density of development will reflect the level of activity at the Harbour.

This is modelled by assuming that employment density on the newly developed land will be similar to the employment density that East Tullos is expected to have in the future in each scenario. In the full development scenario it is also assumed that the 2.3 hectares of land that is currently constrained is also developed.

The assumptions used to model future industrial development are summarised in Table 7-5

Table 7-5 – Industrial development assumptions

Reference Case	Basic Development Scenario	Full Development Scenario
Currently vacant sites at East Tullos are occupied by new warehouses, increasing overall employment density to 108 square metres/job.	Currently vacant sites at East Tullos are occupied by new warehouses and employment density on existing sites increases by 10%. This will increase overall employment density to 99 square metres/job.	Currently vacant sites at East Tullos are occupied by new offices of a similar scale to an existing office on the site and employment density on existing sites increases by 10%. This will increase overall employment density to 80 square metres/job.
All 14.3 hectares of established, unconstrained land supply at Altens, East Altens and Peterseat are developed at a density of 108 /square metres/job.	All 14.3 hectares of established, unconstrained land supply at Altens, East Altens and Peterseat are developed at a density of 99 square metres/job.	All 14.3 hectares of established, unconstrained land supply at Altens, East Altens and Peterseat and 2.3 hectares of constrained supply at Altens East are developed at a density of 80 square metres/job.
Circa. 1,500 new jobs	Circa. 2,200 new jobs	Circa. 4,400 new jobs

Source: BiGGAR Economics economic impact model

7.5.1 Gross to Net Impact

It is possible that some of this additional development will occur at the expense of other industrial estates elsewhere in Aberdeen City and Shire so displacement

could be an issue. As demand for industrial land is generally very high in Aberdeen City and Shire however, it is assumed that in the full development scenario this effect will be small (25%). Under the basic development scenario, it is expected that the industrial estates will be less attractive to potential investors than they would be under the full development scenario so displacement is assumed to be lower (10%).

It is also possible that some displacement will occur at the Scottish level but as there are a variety of alternative sites elsewhere in Aberdeen City and Shire it is assumed that there will be very few developers who are unable to find a suitable site anywhere else in the city so this effect will be very small. Under the full development scenario displacement at the Scottish level is therefore assumed to be 10% and in the basic development scenario it is assumed to be zero.

It is considered unlikely that there will be any displacement at the Scottish level for this type of use and as the development of industrial land will not be influenced by public sector investment decisions there will be no substitution effect.

7.6 Oil and Gas Sector

Recent research undertaken by BiGGAR Economics on behalf of Scottish Enterprise²⁴ suggests that employment in the oil and gas sector in 20 years' time is likely to be around 80% of current levels. This implies that by year 20 the oil and gas sector will employ a little over 56,000 people in Aberdeen City and Shire.

This estimate is however based on the implicit assumption that businesses within the sector will be able to operate efficiently and behave in a way that enables them to maximise their own competitiveness and that of the sector as a whole. If a new harbour is not developed at Nigg Bay then this could prevent businesses in the sector from behaving in this way, which is likely to have a negative impact on the overall competitiveness of the sector. Businesses will only be able to develop in an optimal way if a new harbour is developed at Nigg Bay, which will also enable future increases in harbour related road traffic within the city centre to be avoided.

As discussed elsewhere in this report, the activities of harbour users are already constrained by the capacity of the Harbour. For example, a number of consultees discussed the possibility of moving dive support vessels and other very large vessels to Nigg (north of Inverness) because there are very few berths in Aberdeen that are deep enough to accommodate them.

Whether the nature of the constraint relates to delays in ships being able to berth at the Harbour, the availability of nearby warehousing space or a lack of quayside facilities, the overall effect is to increase the cost of operations. As most current harbour users provide services to the oil and gas sector, this directly increases the costs of extracting oil and gas. As the costs of operations increase, activities that are at the margin of profitability will become unprofitable and the businesses providing these services will exit the market and the industry will decline.

If a new harbour is not developed at Nigg Bay then the operational costs faced by the oil and gas sector will increase faster than currently expected and the anticipated decline of the sector will accelerate. This can be modelled by

²⁴ BiGGAR Economics and Optimat (August 2013), Research and Development in the oil and gas sector: economic and exchequer impacts – update report.

assuming that the 20% decline referred to above will occur within 15 years rather than 20 under the reference case.

If a new harbour is developed at Nigg Bay but improvements are not made to the surrounding roads infrastructure, then the new harbour will not be as efficient as it should be. This will also have an impact on the operational costs of harbour uses.

For example, consultation with existing harbour users suggest that there is currently unfulfilled demand for warehouse space close to the harbour. If a new harbour is developed at Nigg Bay and improvements are made to the surrounding roads infrastructure then this is likely to stimulate investment in nearby industrial estates, which would help to fulfil demand for additional warehouse space. If the surrounding roads infrastructure is not improved however, less development will occur and some of this demand may remain unfulfilled. This would mean that harbour users would need to utilise warehouse space further away from the harbour, which would increase transportation costs and indirectly increase the operational costs of the oil and gas sector.

Although this effect is likely to be small, it would impact on the overall competitiveness of the oil and gas sector and slightly increase its rate of decline. To model this effect it is assumed that in the basic development scenario the decline in the oil and gas sector that is expected in 20 years will instead occur in 17 years' time.

If Nigg Bay is not developed then as well as the industry declining faster, it is also likely that Aberdeen Harbour will gradually become less important to the sector because some of the activity that would have occurred in Aberdeen is likely to be undertaken at other ports, particularly in Norway. Evidence from consultations suggests that this is already occurring to some extent with existing users making use of ports such as Peterhead, Montrose and Dundee, although Aberdeen appeared to be the preference of most users. Due to the significant investment in deep water port facilities on the West coast of Norway it is highly likely that subsea and decommissioning related oil and gas traffic will be diverted there if Nigg Bay is not developed.

This effect can be modelled by including a smaller proportion of oil and gas sector employment in this assessment if a new harbour is not developed or is developed with no improvements to the surrounding infrastructure. For the reference case, 6% of employment is included and for the basic development scenario 8% is included.

The assumptions used to model the future impact of the oil and gas sector are summarised in Table 7-6.

Table 7-6 – Oil and gas sector assumptions

Reference Case	Basic Development Scenario	Full Development Scenario
Employment reaches 80% of current levels in 15 years' time.	Employment reaches 80% of current levels in 17 years' time.	Employment reaches 80% of current levels in 20 years' time.
6% of the total impact of oil and gas sector employment in Aberdeen City and Shire is included.	8% of the total impact of oil and gas sector employment in Aberdeen City and Shire is included.	10% of the total impact of oil and gas sector employment in Aberdeen City and Shire is included.

Source: BiGGAR Economics economic impact model

7.6.1 Gross to Net Impact

In the context of this impact displacement would occur if the development of Nigg Bay caused the oil and gas sector to undertake activity in Aberdeen that would otherwise have occurred in another Scottish port. Although evidence from consultations suggests that current users do use other Scottish ports, it appears that these decisions are generally driven by lack of capacity at Aberdeen rather than a preference for other Scottish ports. This means that the development of Nigg Bay would not be taking business from other Scottish ports but rather accommodating existing surplus demand.

Evidence from consultations also suggests that there is also currently no shortage of demand at other Scottish ports with any shortfall in the provision of berthing at Aberdeen is likely to be accommodated across the North Sea in Norway. This could have potential long term negative implications for the sector in Scotland and means that displacement is unlikely to occur

Investment decisions in the oil and gas sector are driven by oil prices and will not be influenced by public sector investment decisions so there will also be no substitution effect.

8 REFERENCE CASE

In order to estimate what the economic impact of the Nigg Bay harbour development might be it is first of all necessary to establish what the economic impact of Aberdeen Harbour might be in the future if the development does not proceed. This chapter explains the assumptions that have been made in order to calculate this reference case.

8.1 Summary Reference Case Impacts

Using the assumptions described in chapter 7 it can be estimated that in 20 years' time, if no new harbour is developed at Nigg Bay, Aberdeen Harbour will be contributing around £1 billion each year to the Scottish economy and supporting around 8,350 jobs. This impact is summarised in Table 8-1.

Table 8-1 – Summary net economic impact in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£millions)
Aberdeen Harbour Board	160	15	245	22
Other on-site activities	1,765	298	2,110	316
Tourism	1	<0.1	1	<0.1
Total on-site impacts	1,920	313	2,360	338
Off-site logistics	1,335	147	1,540	158
Industrial development	1,615	220	1,935	237
Oil and gas sector	1,925	291	2,515	321
Total of-site impacts	4,880	658	5,995	716
Total	6,800	972	8,350	1,053

Source: BiGGAR Economics economic impact model

8.1.1 Impact by Source

Figure 8-1 presents a break-down by source of the employment impact (top) and GVA impact (bottom) of Aberdeen Harbour in 20 years time under the reference case in Aberdeen City and Shire and in Scotland. The profile of each of the impacts is broadly similar. Almost a third of the impact is due to the Harbour's role in supporting the oil and gas sector. Approximately a further quarter is attributable to industrial development, between 25% and 30% is due to other on-site operations and between 15% and 20% is due to off-site logistics. In each case the impact of Aberdeen Harbour Board is small, accounting for between 2% and 3% and the impact of on-site tourism activity is negligible, accounting for less than 1% of the total impact.

Figure 8-1 – Source of economic impact of Aberdeen Harbour in year 20 – reference case



Source: BIGGAR Economics economic impact model

8.1.2 Impact Over Time

Figure 8-2 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over time under the reference case and Figure 8.3 illustrates the impact in Aberdeen City and Shire. The figures show that in this scenario the total GVA generated and employment supported by the Harbour will gradually fall, largely as a result of reduced activity in the oil and gas sector over the next 20 years.

Figure 8-2 - Economic impact over time – reference case (Scotland)

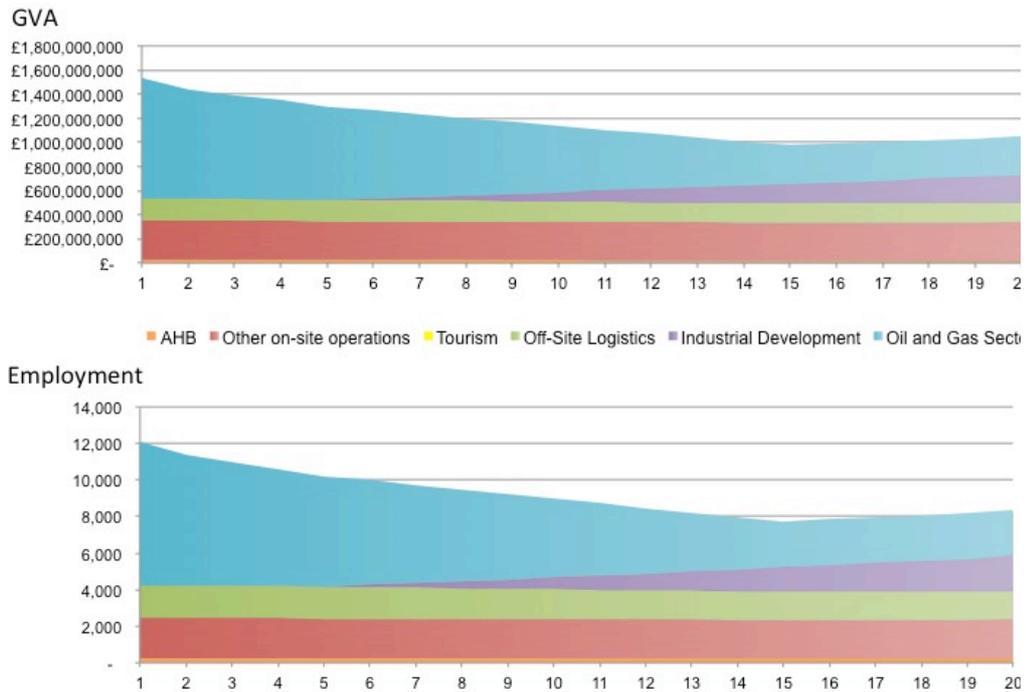
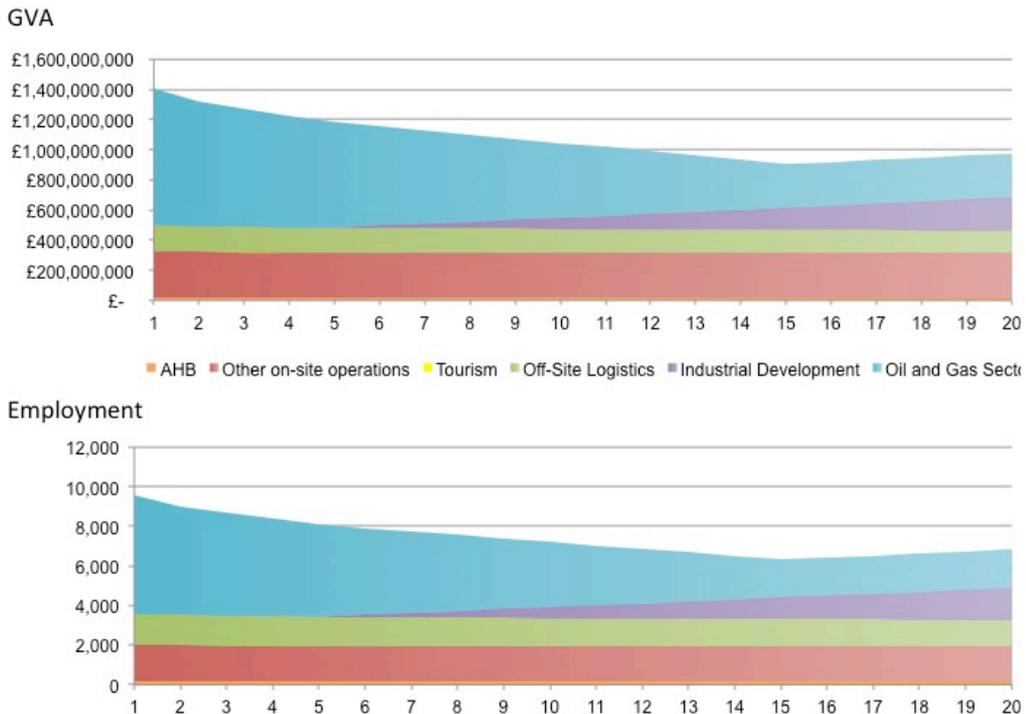


Figure 8-3 - Economic impact over time – reference case (Aberdeen City & Shire)



9 FULL DEVELOPMENT SCENARIO

This section describes the future economic impact of Aberdeen Harbour if a new harbour is developed at Nigg and improvements are made to the surrounding roads infrastructure.

9.1 Summary of Full Development Scenario

If a new harbour is developed at Nigg Bay and improvements are made to the surrounding roads infrastructure then, by year 20, Aberdeen Harbour will be contributing a net benefit of £1.95 billion GVA to the Scottish economy and supporting 15,510 jobs. This is summarised in Table 9-1.

Table 9-1 – Net economic impact of full development scenario in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (millions)
Aberdeen Harbour Board	184	21	295	29
Other on-site operations	2,500	423	2,855	427
Tourism	45	1	65	2
Total on-site impacts	2,730	445	3,215	458
Off-site logistics	1,840	203	2,030	209
Industrial development	3,900	532	5,195	636
Oil and gas sector	3,880	586	5,070	647
Total off-site impacts	9,620	1,321	12,295	1,492
Total	12,350	1,766	15,510	£1,950

Source: BiGGAR Economics economic impact model

9.1.1 Net Additional Benefits

This section summarises the net additional benefits of this development scenario – i.e. the total benefit of the full development scenario less the benefits that would have been realised anyway under the reference case. The net employment impacts of this development scenario at year 5, 10 and 20 are summarised in Table 10-2 and the net present value of the net GVA impacts in these years are summarised in Table 9-3.

Table 9-2 – Net employment impacts of Nigg Bay development (full development)

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Reference case	8,085	10,220	7,195	8,960	6,820	8,380
Full development scenario	9,320	11,685	13,030	16,540	12,350	15,510
Net additional benefit	1,235	1,465	5,835	7,580	5,530	7,130

Source: BiGGAR Economics economic impact model

Table 9-3 – Net present value of net GVA impacts - £billions (full development scenario)

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Reference case	5.8	6.4	10.0	10.9	15.6	17.0
Full development scenario	6.2	6.8	12.6	13.8	23.3	25.7
Net additional benefit	0.4	0.5	2.6	2.9	7.7	8.7

9.1.2 Impact by Source

Figure 9-1 presents a break-down by source of the employment impact (top) and GVA impact (bottom) of Aberdeen Harbour in 20 years time under the full development scenario. The profile in each area for each type of impact is broadly similar. Around a third of the impact is due to the Harbour’s role in supporting the oil and gas sector, approximately a further third is attributable to industrial development, between 18% and 24% is due to other on-site operations and between 11% and 15% is due to off-site logistics. In each case the impact of Aberdeen Harbour Board is small, accounting for between 1% and 2% and the impact of on-site tourism activity is negligible.

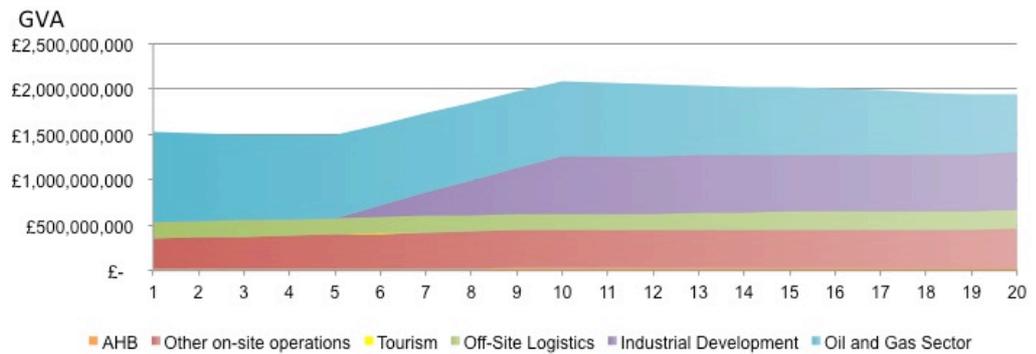
Figure 9-1 – Source of economic impact in year 20 – full development scenario



9.1.3 Impact Over Time

Figure 9-2 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over the next 20 years under the full development scenario and Figure 9-3 illustrates how the impact will change in Aberdeen City and Shire. The figures illustrate how the economic impact of the Harbour will increase, with reduced activity in the oil and gas sector gradually being offset by an increase in industrial development activity from around year 5.

Figure 9-2 – Economic impact over time – full development scenario (Scotland)



Employment

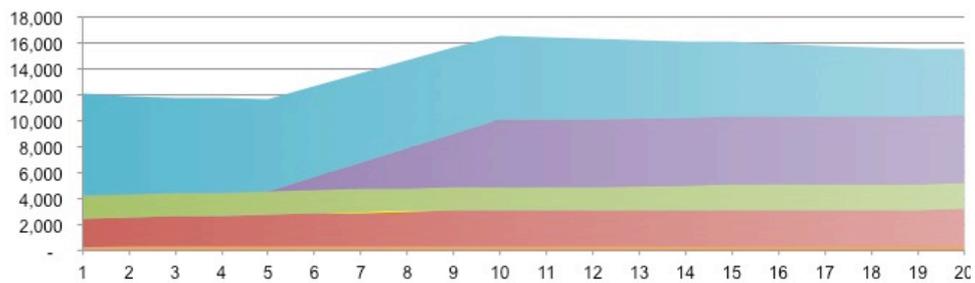
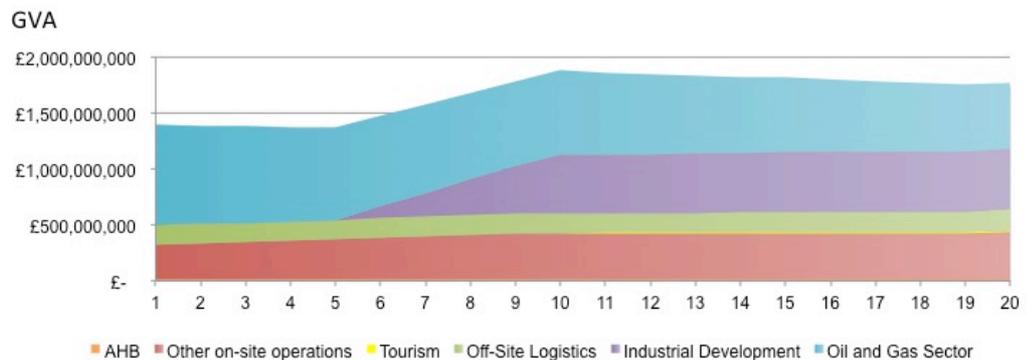
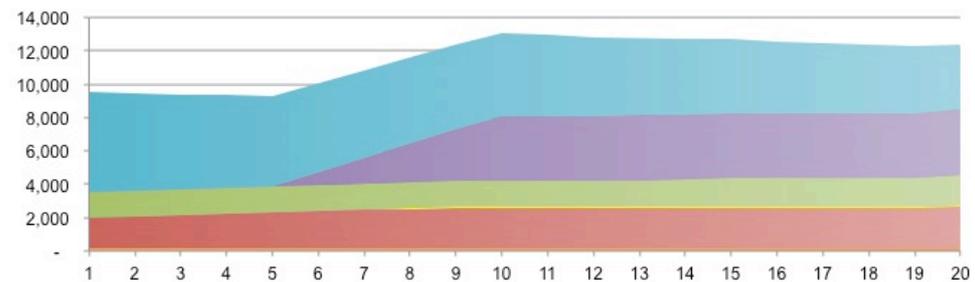


Figure 9-3 – Economic impact over time – full development scenario (Aberdeen C&S)



Employment



10 BASIC DEVELOPMENT SCENARIO

This section describes the economic impact of Aberdeen harbour if a new harbour is developed at Nigg Bay but no improvements are made to the surrounding roads infrastructure.

10.1 Summary – Basic Development Scenario

If a new harbour is developed at Nigg Bay but improvements are not made to the surrounding roads infrastructure then, by year 20, the net impact of Aberdeen Harbour will be around £1.4 billion GVA in Scotland and will support around 11,365 jobs. In Aberdeen City and Shire this impact amounts to almost £1.3 billion and around 9,270 jobs. This is summarised in Table 10-1.

Table 10-1 – net economic impact of basic development scenario in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Aberdeen Harbour Board	185	21	295	29
Other on-site operations	2,540	430	3,000	449
Tourism	30	1	40	1
Total on-site impacts	2,755	452	3,335	479
Off-site logistics	1,865	206	2,120	217
Industrial development	2,275	310	2,810	344
Oil and gas sector	2,370	358	3,100	395
Total off-site impacts	6,515	874	8,030	957
Total	9,270	1,326	11,365	1,436

Source: BiGGAR Economics economic impact model

10.1.1 Net Additional Benefits

This section summarises the net additional benefits of this development scenario – i.e. the total benefit of the basic development scenario less the benefits that would have been realised anyway under the reference case. The net employment impacts of this development scenario at year 5, 10 and 20 are summarised in Table 10-2 and the net present value of the GVA impacts in these years are summarised in Table 10-3.

Table 10-2 – Net employment impacts of Nigg Bay development

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Reference case	8,085	10,220	7,195	8,960	6,820	8,380
Basic development scenario	8,550	10,770	9,050	11,215	9,270	11,365
Net additional benefit	465	550	1,855	2,255	2,450	2,985

Source: BIGGAR Economics economic impact model

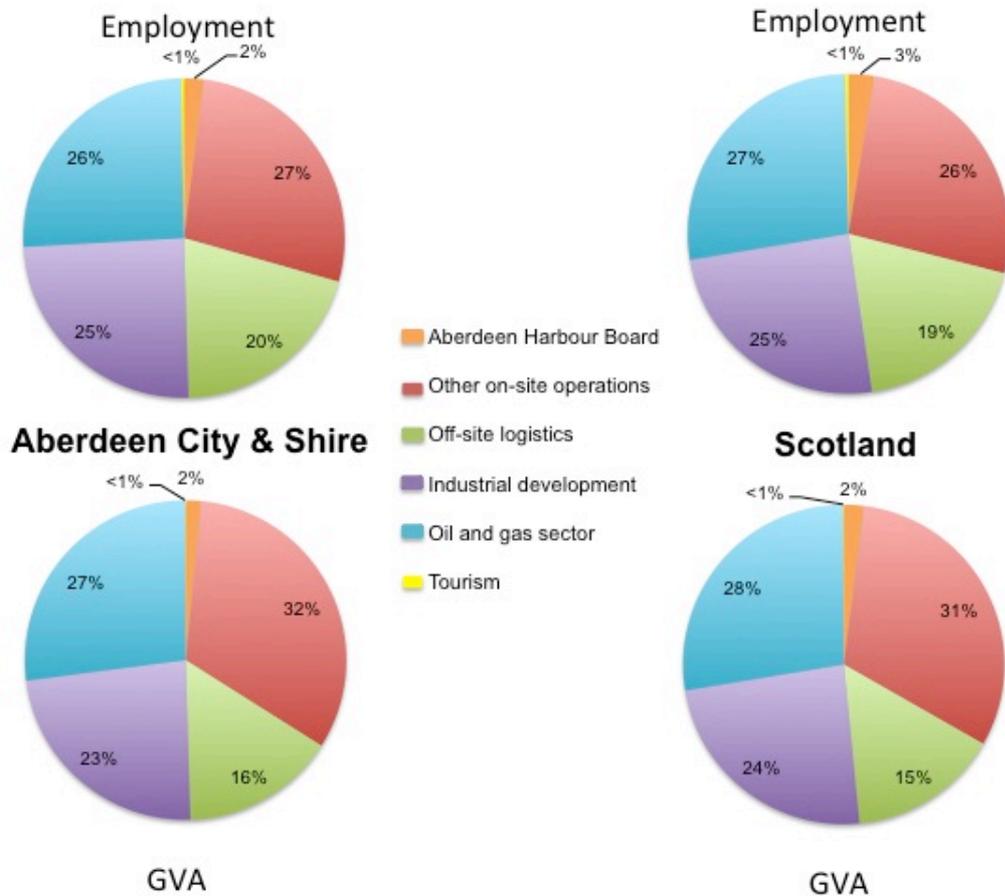
Table 10-3 – Net present value of net GVA impacts of Nigg Bay development (billions)

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Reference case	5.8	6.4	10.0	10.9	15.6	17.0
Basic development scenario	5.9	6.5	10.8	11.8	18.8	20.4
Net additional benefit	0.1	0.1	0.9	0.9	3.1	3.4

10.1.2 Impact by Source

Figure 10-1 presents a break-down by source of the employment impact (top) and the GVA impact (bottom) of Aberdeen Harbour in 20 years time under the basic development scenario. The profile in each area for each type of impact is broadly similar. Between 26% and 32% of the impact is attributable to on-site operations, between 26% and 28% is due to the Harbour's role in supporting the oil and gas sector, approximately a further quarter and between 15% and 20% is due to off-site logistics. In each case the impact of Aberdeen Harbour Board is small, accounting for between 2% and 3% and the impact of on-site tourism activity is negligible.

Figure 10-1 – Source of economic impact in year 20 – basic development scenario



10.1.3 Impact Over Time

Figure 10-2 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over the next 20 years under the basic development scenario and Figure 10-3 illustrates how the impact will change in Aberdeen City and Shire. The figures illustrate how the economic impact of the Harbour will fall slightly from current levels but also shows how some of the fall in oil and gas activity will be offset by increased industrial development activity.

Figure 10-2 – Economic impact over time – basic development scenario (Scotland)

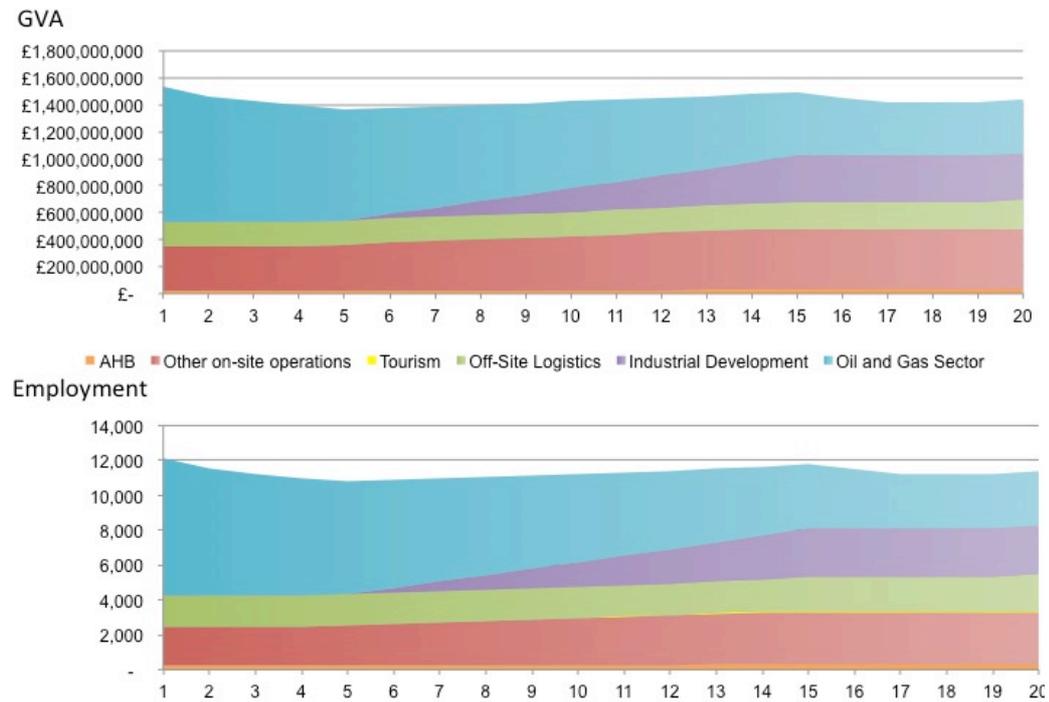
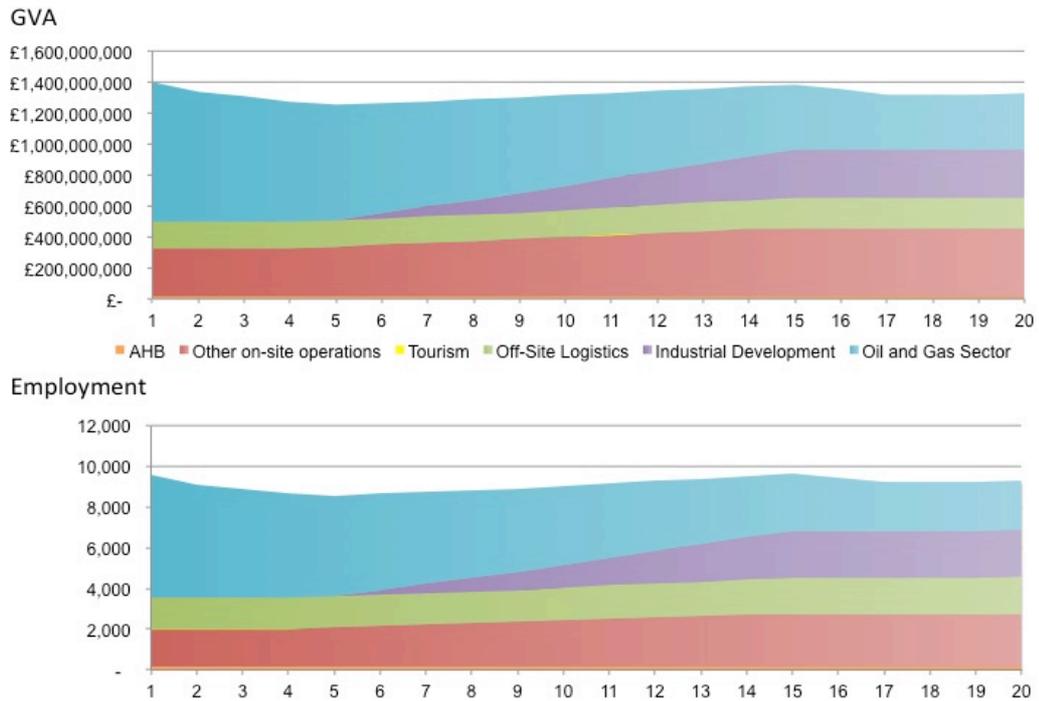


Figure 10-3 – Economic impact over time – basic development scenario (Aberdeen C&S)



11 SUMMARY AND CONCLUSIONS

This section summarises the findings of this report and presents the key conclusions.

11.1 Future Impact of Aberdeen Harbour

If Aberdeen Harbour is not extended and the proposed development at Nigg Bay does not go ahead then it is estimated that in 20 years' time Aberdeen Harbour will be generating £1.1 billion GVA for the Scottish economy and supporting around 8,350 jobs. If a new harbour is developed and improvements are made to the surrounding roads infrastructure, then in 20 years' time Aberdeen Harbour could be contributing £2.0 billion GVA to the Scottish economy and supporting around 15,510 jobs. Alternatively, if a new harbour is created but no improvements are made to the surrounding roads infrastructure, it is expected that the future impact of Aberdeen Harbour will be around £1.4 billion and that it will support around 11,365 jobs. This is summarised in Table 11-1.

Table 11-1 – net economic impact of Aberdeen Harbour in year 20

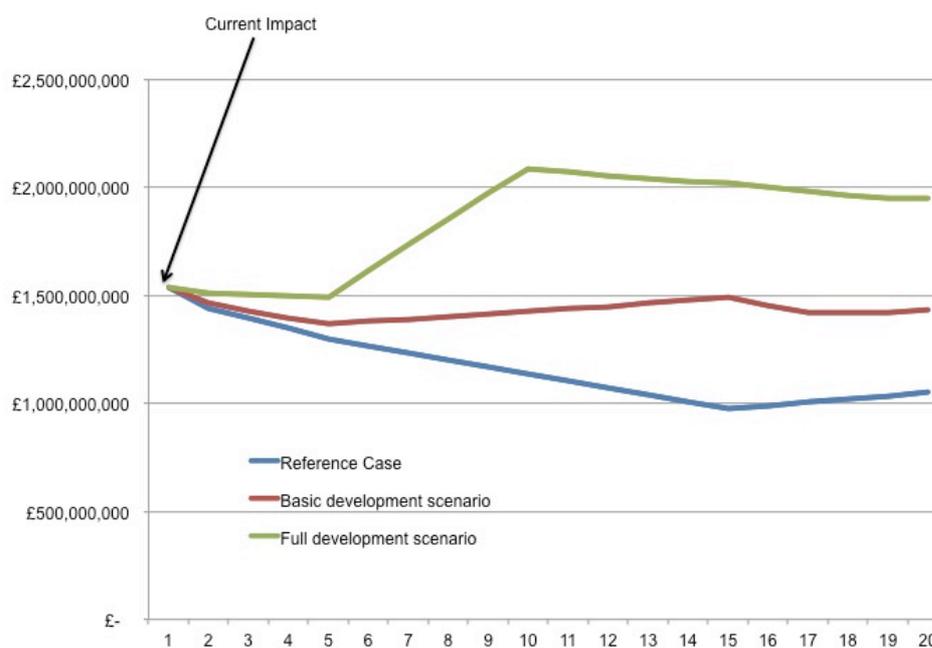
Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (billions)	Jobs	GVA (billions)
Full development scenario	12,350	£1.8	15,510	£2.0
Basic development scenario	9,270	£1.3	11,365	£1.4
Reference case	6,800	£1.0	8,350	£1.1

Source: BIGGAR Economics economic impact model

The difference between the three scenarios is illustrated by the graph below. The blue line in this graph represents the reference case, where the impact of Aberdeen Harbour declines over the next 20 years from its current level, highlighted on the left hand axis. The red line illustrates what the impact of the Harbour would be if a new harbour is created but no improvements are made to the surrounding roads infrastructure. The space between the blue and red lines represents the additional impact that would be generated by this basic development scenario

The green line illustrates the full development scenario, where a new harbour is developed but the surrounding infrastructure is also improved. The space between the green and blue lines represents the additional impact that would be created by this development scenario.

Figure 11-1 - GVA of Aberdeen Harbour over time – alternative development scenarios



Using a discount rate of 3.5% it is possible to estimate the net present value of each development scenario in year five, ten and 20. This is presented in Table 11-2. The total number of jobs that it is expected Aberdeen Harbour will support in year five, ten and 20 is presented in Table 11-3.

Table 11-2 – Net present value of GVA impacts of Nigg Bay development - £billions

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Full development	6.2	6.8	12.6	13.8	23.3	25.7
Basic development	5.9	6.5	10.8	11.8	18.8	20.4
Reference Case	5.8	6.4	10.0	10.9	15.6	17.0

Source: BiGGAR Economics economic impact model

Table 11-3 – Net employment impacts of Nigg Bay development

Impact	Year 5		Year 10		Year 20	
	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland	Aberdeen C&S	Scotland
Full development	9,320	11,685	13,030	16,540	12,350	15,510
Basic development	8,550	10,770	9,050	11,215	9,270	11,365
Reference Case	8,085	10,220	7,195	8,960	6,800	8,350

Source: BiGGAR Economics economic impact model

From this it can be estimated that over a 20 year period:

- **creating a new harbour at Nigg Bay would generate additional GVA for the Scottish economy with a net present value of £8.7 billion and support around 7,160 net additional jobs (i.e. the difference between the full development scenario and the reference case); and**
- **improving the roads infrastructure around Nigg Bay would generate additional GVA for the Scottish economy with a net present value of £5.3 billion and support around 4,145 net additional jobs (i.e. the difference between the full and basic development scenarios).**

12 APPENDIX 1 - SENSITIVITY ANALYSIS

As discussed in chapter 7, estimates about the future impact of Aberdeen Harbour are estimated using assumptions about how different areas of activity might change in the future. If these assumptions turn out to be significantly different to what actually happens in 20 years' time then the impact of future development may be different to that estimated in this report. In order to test the robustness of the conclusions drawn it is therefore helpful to assess what the future impact of the Harbour might be if key areas of activity grow differently to expected.

12.1 Key Assumptions

Under the full development scenario, the two largest sources of impact will be oil and gas sector employment and industrial development.

The main driver for the oil and gas sector impact is the proportion of employment in the sector included in the analysis. In the results reported above, 10% of employment has been included but it is possible that this either under or over estimates the true importance of Aberdeen Harbour to the sector.

The main driver for the industrial development assumption is the number of new jobs expected to be created in the industrial estates surrounding Nigg Bay over the next 20 years. In the results reported above, it is assumed that in the full development scenario around 4,400 new jobs will be created but it is possible that this may not turn out to be the case.

In order to test these assumptions the following changes were made to the economic impact model:

- the proportion of oil and gas sector employment included in the assessment was first reduced to 5% and increased to 20%; and
- the number of new jobs supported in the surrounding industrial estates was first reduced by 10% then increased by 10%.

Finally optimistic and pessimistic scenarios were tested. In the optimistic scenario 20% of oil and gas sector employment was included in the assessment and the number of jobs supported in the industrial estates was 10% higher than described in the report. In the pessimistic scenario 5% of oil and gas sector employment was included in the assessment and the number of jobs supported in the industrial estates was 10% lower than described in the report. The results of this analysis are presented in Table 12-1.

This shows that even in the pessimistic scenario outlined above, over a 20 year period:

- creating a new harbour at Nigg Bay would generate additional GVA for the Scottish economy with a net present value of £6.2 billion and support around 5,075 jobs. (This compares to an impact of £8.7 billion GVA and 7,130 net additional jobs described above); and
- even if no improvements were made to the roads infrastructure around Nigg Bay, developing a new harbour would still generate additional GVA for the Scottish economy with a net present value of £2.3 billion and support around 2,155 net additional jobs. (This compares to an impact of £5.3 billion GVA and 2,985 net additional jobs described above).

If the assumptions made in the report turn out to be overly conservative, the impact of developing the new harbour at Nigg Bay could be very much higher. This is illustrated by the optimistic scenario.

Table 12-1 – Net present value of net additional GVA impacts of Nigg Bay development - £billions (Scotland)

	Full development scenario		Basic development scenario	
	NPV of net additional GVA in year 20	Net additional jobs	NPV of net additional GVA in year 20	Net additional jobs
5% of oil and gas sector included	6.6	5,400	2.4	2,245
20% of oil and gas sector included	12.7	10,580	5.3	4,460
10% fewer jobs created in industrial estates	8.3	6,800	3.3	2,895
10% more jobs created in industrial estates	9.1	7,455	3.5	3,070
Optimistic scenario	13.1	10,905	5.4	4,550
Pessimistic scenario	6.2	5,075	2.3	2,155

Source: BiGGAR Economics economic impact model

13 APPENDIX 2 – GLOSSARY

The four development scenarios considered in this report are:

- current impact – the economic impact of Aberdeen Harbour in 2012/13;
- reference case – the economic impact of Aberdeen Harbour in 20 years if a new harbour is not developed at Nigg Bay;
- full development scenario - the economic impact of Aberdeen Harbour in 20 years if a new harbour is developed at Nigg Bay and the surrounding roads infrastructure is improved; and
- basic development scenario – the economic impact of Aberdeen Harbour in 20 years if a new harbour is developed at Nigg Bay but the surrounding roads infrastructure is not improved.

Other technical terms used in this report include

- gross value added (GVA) - generally regarded as the best measure of the total wealth creation in a given area (e.g. Scotland). It measures the economic contribution of each business. GVA is the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs; and
- net present value (NPV) – the current value of future economic impacts.

The sources of economic impact considered in this report include:

- **Aberdeen Harbour Board** – the direct and indirect impacts of Aberdeen Harbour Board including its expenditure on supplies and the expenditure of its staff;
- **other harbour operations** – the direct impact of other businesses located within the Harbour and the indirect impact of the expenditure of their staff;
- **tourism** – the direct and indirect impact of tourism expenditure generated by cruise ships visiting Aberdeen Harbour;
- **off-site logistics** – the direct impact of Harbour related logistics activity based outside the Harbour and the indirect impact of the expenditure of people employed by these businesses;
- **industrial development** – the direct impact of new industrial development associated with the Harbour and of the expenditure of people employed in these developments; and
- **oil and gas** – the direct impact associated with oil and gas activity in Aberdeen City and Shire supported by the Harbour and of the expenditure of employees whose jobs are supported by this activity.

14 APPENDIX 3 – SCENARIO COMPARISONS

This appendix summarises the current impact of Aberdeen Harbour and the future impact expected under each of the three development scenarios.

14.1 Current Impact in 2012/13

The economic impact of Aberdeen Harbour in 2012/13 is summarised in Table 14-1.

Table 14-1 – net economic impact of businesses located at Aberdeen Harbour

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Aberdeen Harbour Board	161	16	250	23
Other on-site operations	1,835	311	2,200	329
Tourism	1	<0.1m	1	<0.1m
<i>Total on-site impact</i>	<i>2,000</i>	<i>327</i>	<i>2,455</i>	<i>352</i>
Off-site logistics	1,535	169	1,770	181
Industrial development	n/a	n/a	n/a	n/a
Oil and gas sector	6,015	907	7,860	1,002
<i>Total off-site impact</i>	<i>7,550</i>	<i>1,077</i>	<i>9,630</i>	<i>1,184</i>
Total impact	9,550	1,403	12,080	1,536

Source: BIGGAR Economics economic impact model

14.2 Reference Case Scenario in Year 20

The economic impact of Aberdeen Harbour in 20 years' time if no new harbour is built at Nigg Bay is summarised in Table 14-2.

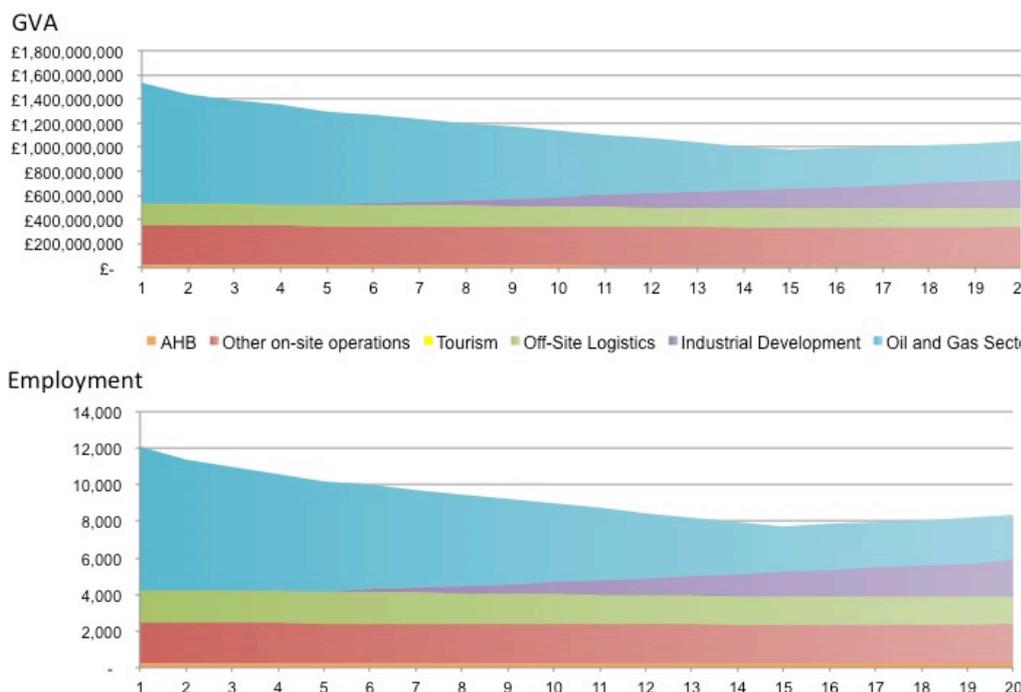
Table 14-2 – Summary net economic impact in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£millions)
Aberdeen Harbour Board	160	15	245	22
Other on-site activities	1,765	298	2,110	316
Tourism	1	<0.1	1	<0.1
Total on-site impacts	1,920	313	2,360	338
Off-site logistics	1,335	147	1,540	158
Industrial development	1,615	220	1,935	237
Oil and gas sector	1,925	291	2,515	321
Total of-site impacts	4,880	658	5,995	716
Total	6,800	972	8,350	1,053

Source: BIGGAR Economics economic impact model

Figure 14-1 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over time under the reference case.

Figure 14-1 - Economic impact over time – reference case (Scotland)



14.3 Full Development Scenario in Year 20

The economic impact of Aberdeen Harbour in 20 years' time if a new harbour is developed at Nigg Bay and improvements are made to the surrounding roads infrastructure is summarised in Table 14-3.

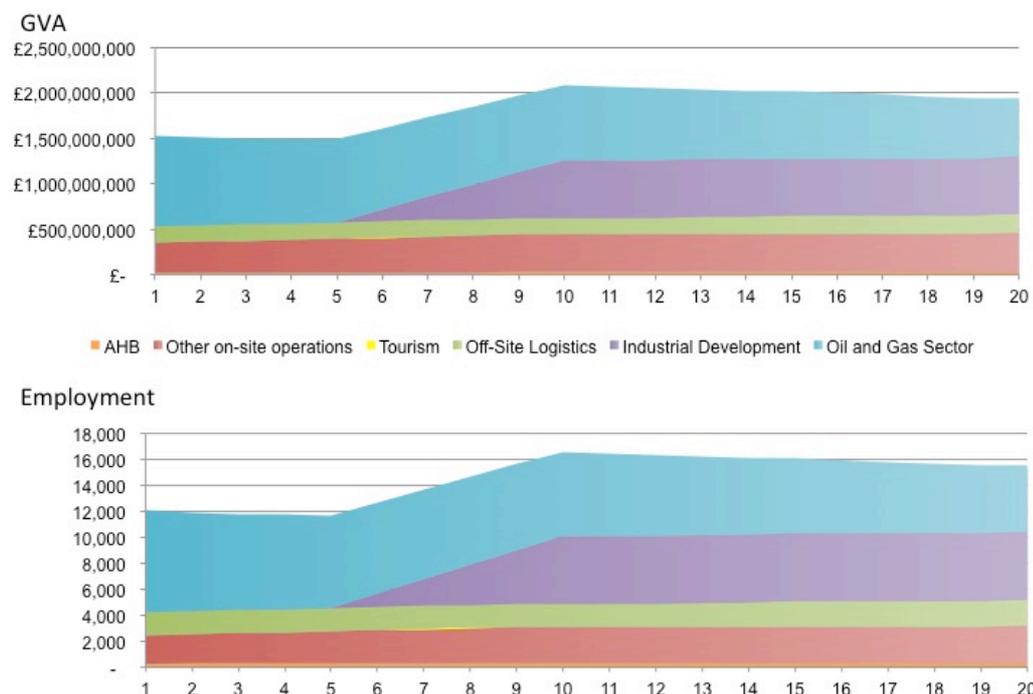
Table 14-3 – Net economic impact of full development scenario in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (millions)
Aberdeen Harbour Board	184	21	295	29
Other on-site operations	2,500	423	2,855	427
Tourism	45	1	65	2
Total on-site impacts	2,730	445	3,215	458
Off-site logistics	1,840	203	2,030	209
Industrial development	3,900	532	5,195	636
Oil and gas sector	3,880	586	5,070	647
Total off-site impacts	9,620	1,321	12,295	1,492
Total	12,350	1,766	15,510	£1,950

Source: BIGGAR Economics economic impact model

Figure 14-2 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over the next 20 years under the full development scenario.

Figure 14-2 – Economic impact over time – full development scenario (Scotland)



14.4 Basic Development Scenario in Year 20

The economic impact of Aberdeen Harbour in 20 years' time if a new harbour is developed at Nigg Bay but improvements are not made to the surrounding roads infrastructure is summarised in Table 14-4.

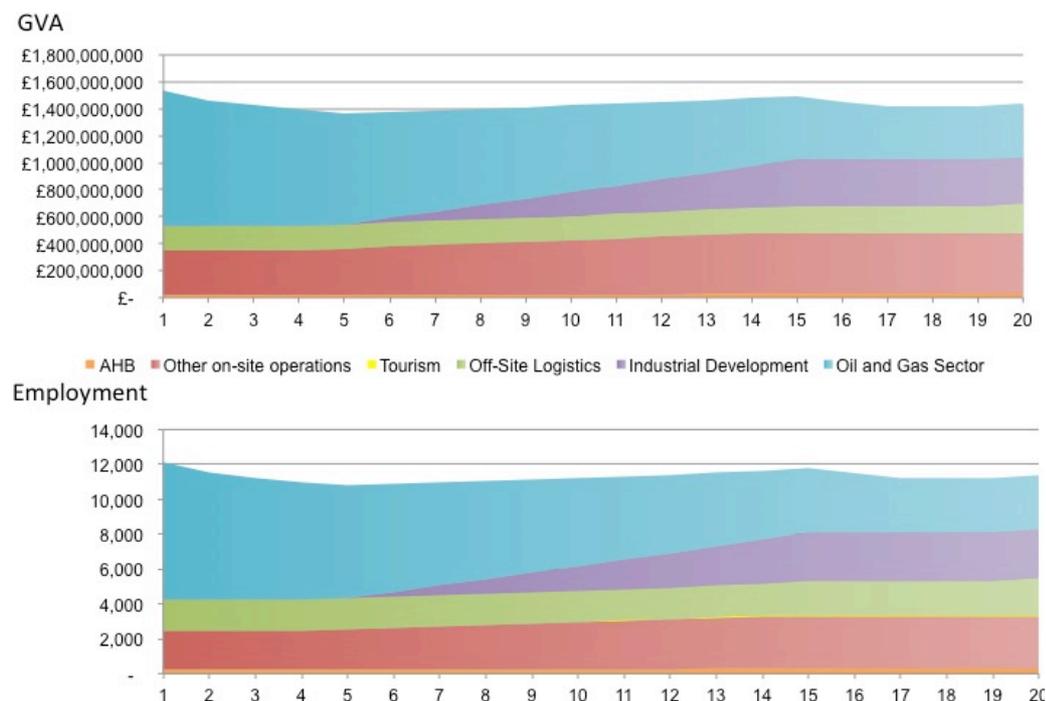
Table 14-4 – net economic impact of basic development scenario in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (£ millions)	Jobs	GVA (£ millions)
Aberdeen Harbour Board	185	21	295	29
Other on-site operations	2,540	430	3,000	449
Tourism	30	1	40	1
Total on-site impacts	2,755	452	3,335	479
Off-site logistics	1,865	206	2,120	217
Industrial development	2,275	310	2,810	344
Oil and gas sector	2,370	358	3,100	395
Total off-site impacts	6,515	874	8,030	957
Total	9,270	1,326	11,365	1,436

Source: BIGGAR Economics economic impact model

Figure 14-3 illustrates how the economic impact that Aberdeen Harbour has on Scotland is expected to change over the next 20 years under the basic development scenario.

Figure 14-3 – Economic impact over time – basic development scenario (Scotland)



14.5 Net Economic Impact in Year 20

The net economic impact of Aberdeen Harbour in year 20 under each of the development scenarios is summarised in Table 14-5.

Table 14-5 – net economic impact of Aberdeen Harbour in year 20

Impact	Aberdeen C&S		Scotland	
	Jobs	GVA (billions)	Jobs	GVA (billions)
Full development scenario	12,350	£1.8	15,510	£2.0
Basic development scenario	9,270	£1.3	11,365	£1.4
Reference case	6,800	£1.0	8,350	£1.1

Source: BIGGAR Economics economic impact model

14.6 GVA of Aberdeen Harbour Over Time

The GVA of Aberdeen Harbour over time is illustrated in Figure 14-4.

Figure 14-4 - GVA of Aberdeen Harbour over time – alternative development scenarios

