Adran yr Economi, Gwyddoniaeth a Thrafnidiaeth
Department for Economy and Infrastructure

Llywodraeth Cymru
Welsh Government

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) (Amendment) Scheme 201-

The London to Fishguard Trunk Road (East of Magor to Castleton) Order 201-

The M4 Motorway (West of Magor to East of Castleton) and the A48(M) Motorway (West of Castleton to St Mellons)(Variation of Various Schemes) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and The London to Fishguard Trunk Road (east of Magor to Castleton) (Side Roads) Order 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and the London to Fishguard Trunk Road (East of Magor to Castleton)) Compulsory Purchase Order 201-

The M4 Motorway (Junction 23 (East Of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East Of Magor) Connecting Road) (Supplementary) Scheme 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East Of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East Of Magor) Connecting Road) and The London to Fishguard Trunk Road (East of Magor to Castleton)) Supplementary Compulsory Purchase Order 201-

Proof of Evidence

Jonathan Vine, MNI

Welsh Government, Shipping

Document Reference: WG 1.22.1

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1. INTRODUCTION

1.1 Personal Details

1.1.1 My name is Jonathan Paul Vine. I am employed by Global Maritime Consultancy Ltd (Eagle Lyon Pope) as Ports and Shipping Manager.

1.1.2 My qualifications include a valid Master Mariner's (unlimited) certificate of competency. I have over 27 years of experience in the shipping and offshore industries serving in various roles such as a marine pilot, marine consultant, tow master and deck officer.

1.1.3 I am a Freeman of the Honourable Company of Master Mariners (HCMM) in London. I am also a member of the Nautical Institute (MNI) and in 2010 I was the chairman of the Humber Area Branch.

1.1.4 In 1989 I joined James Fisher and Sons Ltd as a deck officer cadet serving on dry cargo vessels and product tankers. In 1992 I achieved my first deck officer certificate of competency and was promoted to third officer working on tankers and a dynamically positioned geotechnical drill ship operating worldwide. This was then followed by an extensive period serving as second officer on a cable ship laying fibre optic telephone cables worldwide.

1.1.5 In 1998 I completed a BTEC Higher National Diploma in Nautical Science and gained my mates/masters' certificate of competency entitling me to serve as chief officer on any vessel. In the same year I joined P&O Ferries serving as second officer on large roll-on / roll-off passenger ferries operating in the Irish Sea and North Sea. In 2001 I was promoted to chief officer of a large passenger ferry running between Hull and Rotterdam.

1.1.6 January 2002 until October 2010 I was employed by Associated British Ports (ABP) as a marine pilot on the river Humber. At this time my pilotage jurisdiction also included the rivers Ouse and Trent, the dock systems of Hull, Goole, Immingham, Grimsby and the river terminals on the river Humber. I regularly manoeuvred vessels with or without the aid of tugs within the tidal estuary and dock systems. During this time I was also an active member of

the Safety of Navigation Review Committee where I reviewed incidents involving vessels within the pilotage district and made recommendations to aid the prevention of reoccurrence. A number of vessels that have visited the port of Newport are known to me as I have piloted some of them previously.

1.1.7 I left the pilot service in 2010 and became a marine consultant advising insurers and maritime lawyers on marine issues such as fixed object damage, vessel collisions, and groundings. Other marine consultancy work included acting as marine warranty surveyor for pipeline, offshore platforms and FPSO installations. I have undertaken up to 60 vessel surveys and inspections on behalf of oil and gas operators.

1.1.8 I joined Interocean Marine Services Ltd. in October 2012 where I acted as tow master and/or marine representative tasked with moving semi-submersible drilling units with the aid of tugs. To date I have carried out over 30 rig moves without incident.

1.1.9 In 2014 I was contracted to ConocoPhillips in Aberdeen as Marine Specialist. My role included the marine assurance of all vessels chartered by the North Sea business unit, the planning and execution of rig moves, the chartering of vessels, the conduct of marine incident investigations and marine representation offshore during projects.

1.1.10 Global Maritime (GM) first employed me in 2012 as senior mariner in the marine warranty department; I left the company in 2013. In May 2016 I re-joined GM in the ports and shipping department as Principal Mariner.

1.1.11 Throughout the inception of the proposed Scheme, GM incorporating Eagle Lyon Pope (ELP) have provided marine advice and conducted analysis on the behalf of the Welsh Government. However, I was not involved with the drafting and/or analysis of any of the previous reports carried out by Eagle Lyon Pope and/or Global Maritime.

1.1.12 In June 2016 I was appointed by the Welsh Government to provide marine expertise to the Welsh Government and M4 CaN project team. In particular I have advised on:

a) Air draught, draughts, under keel clearances, air draught clearances and safety margins.

b) Ship types and the carriage of cargoes.

c) Vessel manoeuvring and the use of tugs.

d) Operation of dock and lock systems.

e) Dock and river water levels and the effect of the tide.

f) The impact on shipping following and during the construction of the proposed Scheme over the Newport Docks and the river Usk.

1.1.13 I was not involved in the design of either of the proposed bridges spanning the Newport Docks or the river Usk, nor was I involved at any stage with the selection of the route for the Scheme. I was not involved in any of the shipping analysis previously carried out by Global Maritime, forming the basis of Global Maritime's M4 CaN Draft Shipping Analysis Report GM-46948-475084.

1.1.14 The evidence that I have prepared and provide in this Proof of Evidence is true and I confirm that the opinions expressed are my true and professional opinions.

1.2 Scheme Background

1.2.1 The proposed new section of motorway would run between Junction 29 at Castleton and Junction 23 at Magor. To the east of the Castleton junction, the proposed new section of motorway would depart from the route of the existing M4 motorway at Junction 29 and would pass to the south of Duffryn before crossing the Rivers Ebbw and Usk to the south of the A48 at Newport Docks.

1.2.2 The River Usk Crossing would cross the Newport Docks between the South Dock and North Dock, before straightening out over the main bridge crossing of the River Usk.

1.3 Objections

1.3.1 ABP have made two separate objections to the proposed Scheme. In a letter dated 29th April 2016, Winckworth Sherwood acting on behalf of ABP, issued a formal objection to the draft Orders and in a letter dated 29 April 2016, ABP made a representation to the Secretary of State for Transport under section 16 of the Acquisition of Land Act 1981 objecting to the proposed Scheme.

1.3.2 ABP's representation to the Secretary of State for Transport included the following points:

a) 'The Port is a facility that […] forms a significant component within the transport and economic infrastructure of Wales […] which has either been ignored or fundamentally misunderstood by Welsh Government'.

b) 'the proposed M4 Relief Road scheme will […] have a critically serious and detrimental impact upon the Port in terms of current and future operational viability'.

1.3.3 In a letter dated the 22nd April 2016 the Newport Harbour Commissioners (NHC) also made a formal objection to the proposed Scheme. Their objection was based on their belief 'that the construction of a motorway across a major Welsh infrastructure asset would have a deleterious effect on the local economy. For instance, the costs of administering this organisation, which is none profit making, would have to be covered by the remaining stakeholders'. They claim that, in order for the organisation to continue to operate, the harbour dues charged to vessels visiting the Port would need to be increased and conclude their objection with the statement 'Generally, the proposed restrictions on foreign trade will not assist Newport to thrive'.

1.3.4 In a letter dated 26th April 2016 Graham Dickinson, acting on the behalf of WE Dowds Shipping Ltd. made a formal objection to the proposed Scheme, citing amongst other things not connected with the shipping aspects of this Proof of Evidence the following:

'The proposed bridge height above the entrance to North Dock is inadequate to accommodate the larger vessels currently serviced by the Company in that

part of the dock. As shipping traffic has built up, leading to congestion in South Dock, it is understood that ABP are actively considering enlarging the entrance to allow even larger vessels to use North Dock. The latter otherwise has the necessary quay lengths and water depth to handle much larger ships. The height restriction imposed by the current road design will curtail some existing business and forestall the prospect of such enlargement'.

1.3.5 In a letter dated 14th April 2016, TU Agencies Ltd. made a formal objection to the proposed Scheme on the basis of:

'The proposed route of the M4 passes over Newport Docks on a line which separates the North Dock from the South Dock. This will mean that the North Dock will no longer be accessible form many vessels now using the facilities of the North Dock. Furthermore it will make any future development of the North Dock very unlikely, which will have a direct adverse impact on our future business prospects'.

1.3.6 In a letter dated 4th May 2016, Gerald Eve acting on behalf of Jewson Ltd. and Saint-Gobain Building Distribution Ltd, made a formal objection to the proposed Scheme, citing amongst other things not connected with the proposed Scheme the following:

'[…] and the subsequent construction of the proposed motorway further to the road orders, will also prevent or significantly impede access to the Newport Docks by ships. Without the ability to continue to import timber by ship the Newport facility of Jewson and Saint-Gobain would be unable to operate'.

1.3.7 The following businesses and organisations either directly involved with the Port of Newport and/or the Docks or situated within the dock estate also objected to the proposed Scheme. These include:

a) Port Security Authority

b) CJN Engineering Ltd

1.4 Scope and Structure of the Evidence

1.4.1 My Proof of Evidence will initially provide an overview as to the operation of the Newport Docks and Lock system. The Proof of Evidence will then go on to describe the planned height of the M4 motorway bridge relative to the water

levels in Newport Docks and the River Usk, the reference datum used and the required safety clearances.

1.4.2 My evidence will then address in detail the impact the proposed M4 Corridor around Newport (hereafter referred to as the Scheme) would have on shipping and the navigation of vessels in Newport Docks and the river Usk.

1.4.3 I will also present and explain the shipping analysis that I have carried out and describe the conclusions that I have drawn from the analysis.

1.4.4 Details of the substantive issues regarding the economic impact the Scheme may have on the docks and river berths on the Usk and the effects of climate change on sea levels will be presented by other expert witnesses in their Proofs of Evidence:

a) Mr Andrew Meaney (Oxera) – Port Economics (WG 1.4.1).

b) Dr Paul Canning (Atkins) – Tidal Flooding (WG 1.16.1)

c) Mr Matthew Jones (Welsh Government) – Chief Witness (WG 1.1.1)

d) Mr Ben Sibert (Arup) – Engineering (WG 1.5.1)

e) Mr Barry Woodman (Costain) – Construction (WG 1.6.1)

1.4.5 My Proof of Evidence is presented in the following structure:

a) In Section 1, I provide personal details, an introduction to the Scheme and the list of objections.

b) In Section 2, I introduce the Port of Newport and the proposed River Usk crossing.

c) In Section 3, I explain the factors that are required to be taken in consideration by vessels visiting the Newport Docks.

d) In Section 4, I establish the navigation clearance which is the basis for determining the potential effect of the Scheme on shiping.

e) In Section 5, I detail the data analysis that was undertaken to quantify the restrictions imposed on shipping by the Scheme.

f) In Section 6, I detail the study undertaken to assess whether spare berth capacity exist in the South dock.

g) In Section 7, I address the impact of the Scheme on shipping within the River Usk.

h) In Section 8, I provide a view on the aforementioned objections to the Scheme, from a shipping/marine perspective

i) In Section 9, I provide my conclusions.

1.5 References

1. ABP Acceptance tables for Newport Docks and the river Usk
2. ABP Newport Dock Chart
3. DNV H202 Standard Offshore Standard DNV-OS-H202 (October 2015) Sea Transport Operations
4. Newport Docks Plan PTS015/ND/000
5. Newport Harbour Commissioners Policy and Strategic Objectives Document (January 2012).
6. Port Marine Safety Code (March 2015)
7. Guide to Good Practices on Port Marine Operations (March 2015)
8. NP 37 West Coast of England and Wales Pilot (19th Edition 2014)
9. NP 201 – Admiralty Tide Tables Volume 1 - 2016
10. BA Chart 1176 Severn Estuary – Steep Holm to Avonmouth (11th Edition 2016)
11. National Oceanography Centre – National Tidal and Sea Level Facility www.ntslf.org (Accessed 19/09/2016)
12. Tsinker.G.P (2004) Port Engineering – Planning, Construction, Maintenance and Security.

2. THE PORT OF NEWPORT AND THE PROPOSED SCHEME

2.1 Newport Docks

2.1.1 The Port of Newport is situated on the north side of the Bristol Channel and comprises the enclosed Newport Docks and the berths, docks and wharves on the river Usk. The port handles a wide variety cargoes such as timber, bulk cargoes, agri-bulk cargoes, steel products, scrap steel, coal, explosives, aggregates and project cargoes (Appendix B).

2.1.2 Newport Docks are owned and operated by Associated British Ports (ABP). The company is the Statutory and Competent Harbour Authority for the Docks. As the Statutory Harbour Authority they have been conferred statutory powers under enabling legislation (principally the Harbours Act 1964, the Pilotage Act 1987, the Marine Navigation Act 2013 and local legislation) to, amongst other things, create bylaws, provide a pilot service and direct shipping. ABP's jurisdiction in the role of Competent Harbour Authority (CHA) extends for a distance of 100 yards beyond the Docks boundary (See Appendix C).

2.1.3 Under the proposed Scheme it is intended to construct a road bridge crossing the Newport Docks at the access point between the North and South Docks known as the Junction Cut. The bridge would also cross the river Usk at a position just south of Dallimore's Wharf (Appendix D)

2.1.4 Newport Docks comprises two docks namely the North and South docks; these are connected by a passage known as the Junction Cut. The Junction Cut is reported to have a navigable width of 17.4m wide (Ref 8).

2.1.5 The South Dock is accessed by vessels from the river Usk via the South Lock. For passage plan purposes, maximum draught vessels are to be in the lock with the gates closed at approximately 10 minutes before the time of high water. The approach channel to the lock in the river Usk, is dredged to a depth of 0.7m below chart datum (ACD), due to siltation, this depth is not guaranteed. The South Lock is 305 m long, 30.5 m wide, and is fitted with

three sets of lock gates, the gates allow the lock to be divided into two separate sections. (See Appendix E).

2.1.6 The level of water within the Docks is maintained by two impounding pumps, and it is understood that there is also a freshwater feed into the North Dock. The mitred lock gates are configured in such a way that the dock water level must always be higher than the river level.

2.1.7 The published data on the South Wales Port Website identifies that the 'normal dock water level' is 13.04m referenced to Admiralty Chart Datum (ACD) (Appendix F). The height of the coping level in the dock (height of the dock wall) is 14.61m (ACD). For details on datum heights and the relationship between datum, mean high water springs, a vessel's draught and under keel clearance, please see Appendix G.

2.1.8 Chart Datum is the plane below which all depths are published on a British Admiralty (BA) navigation chart. It is also the plane to which all tidal heights are referred, so by adding the tidal height to the charted depth, the true depth of water is determined. By international agreement Chart Datum is defined as a level so low that the tide will not frequently fall below it. In the United Kingdom, this level is normally approximately the level of the Lowest Astronomical Tide (LAT).

2.1.9 Ordnance Datum (Newlyn) is the datum of the land levelling system on the mainland of England, Scotland and Wales, and on some of the closer islands offshore; this datum was established at the level of the average value of Mean Sea Level at Newlyn for the six-year period during 1915-21 and is used primarily on land by civil engineers.

2.1.10 In order to convert Admiralty Chart Datum to Ordnance Datum Newlyn 5.81m is subtracted from the Admiralty Chart Datum (ACD) height.

2.1.11 ABP publish vessel Acceptance Tables for Newport Docks. For a dock level of 11.74m (datum not given), vessels of draughts (see Appendix H) ranging from 5m to 10m and beams of up to 28m can be allowed by ABP's shipping coordination centre, Cardiff Local Port Services (LPS) or the ABP Lock

Controller, to enter the South Dock without referral to the ABP Harbour Master. Vessels of 40,000 tonnes deadweight, 244m in length, 30.1m beam and a maximum draught of 10.4m and over may be accepted into the South Dock with the consent of the ABP Harbour Master.

2.1.12 The ABP Acceptance Tables (Appendix H) for Newport Docks provide that for a dock level of 11.74m (datum not given), vessels of draughts ranging from 6.5m to 7.0m and 16.0m beam, can be accepted by Cardiff LPS or the Lock Controller for entry into the North Dock without referral to the ABP Harbour Master. Ref 10 provides a maximum depth of water in the North Dock of 8.2 m. Vessels of 8,000 tonnes deadweight and up to 10,000 tonnes (approximately), 122m length, 17.0m beam and 7.6m draught may be accepted with the consent of the Harbour Master. Vessels of a length greater than 122m may be accepted into the North Dock, however these vessels would be unable to turn inside the North dock and would have to be either backed in or out.

2.1.13 The ABP Newport Docks Acceptance Tables (Appendix H) provide densities of the dock water ranging from 1002 to 1010. The water density varies because of the fresh water feed into the North dock and the amount of impounded water introduced into the dock. The water density will affect the buoyancy of a ship. The greater the water density the more buoyant the vessel becomes and therefore its draught will reduce. A vessel is more buoyant in seawater than in fresh water. This is unlikely to have much of an effect on vessels entering the North Dock in terms of change of draught with a change of water density and has therefore not been considered when calculating air draft clearances.

2.1.14 ABP's Newport Docks Plan taken from the South Wales Ports website (Appendix F), shows the berths within the South and North Dock. The docks comprise 'Leased' and 'Common User' berths. The use of the leased berths are exclusive to the tenant. The common user berths are not exclusive and can be allocated by ABP to any vessel visiting the Docks. The berths are distributed as follows:

Table 2-1 South Dock Berths

Section Number	Berth Name	Type	Berth Length
Section 1	South Quay	Steel / General Cargo (ABP common user berth)	177 m
Section 2	South Quay	Steel / General Cargo (ABP Common User Berth)	183 m
Section 3	South Quay	Steel / General Cargo (ABP Common User Berth)	183 m
Section 4	South Quay	Steel / General Cargo (ABP Common User Berths)	61 m
Section 5	South Quay	Solid Fuel (leased)	335 m
Section 6	South Quay	Solid Fuel (leased)	92 m
Section 7	North Quay	Bulk / General Cargoes (Common user berths)	106 m
Section 8	North Quay	Bulk / General Cargoes (Common user berths)	92 m
Section 9	North Quay	Bulk / General Cargoes (Common user berths)	92 m
Section 10	North Quay	Scrap Metals (Leased)	220.5 m
Section 11	Middle Quay	Vessel lay-by berth (ABP Common User Berth).	160 m
Section 12	Middle Quay	Vessel lay-by berth (ABP Common User Berth).	93 m
	East Lock	Bulk cement / Timber / general cargo	Unknown
	Cement berth	Unused	Unused
	Sand Terminal	Bulk Aggregates (leased)	

2.1.15 The north western and western berths (sections 18 and 19) comprising of approximately 540 m of quay space, except for the Severn Sands Terminal in the South Dock, are currently in a state of disrepair and are unused. See ABP Docks Plan in Appendix F.

2.1.16 The berth usage is divided as follows for the North Dock:

Table 2-2 North Dock Berths

Berth Section No.	Berth Name	User	Type	Length
Section 21	Dowd's North Dock	ABP Common User	Steel / General Cargo	136 m
Section 22	Dowd's North Dock	ABP Common User	Steel / General Cargo	139 m
Section 23	Jewson's North Dock	ABP Common User	Timber / General Cargo	102 m
Section 24	Jewson's North Dock	ABP Common User	Timber / General Cargo	112 m
Section 25	Jewson's North Dock	ABP Common User	Timber / General Cargo	138 m
Section 26	Jewson's North Dock	ABP Common User	Timber / General Cargo	112 m
	Old Dry Dock Corner	Leased	Tug berth / refuelling	
	Bailey's dry Dock	Unused	Unused	Unused

2.1.17 The north western and western sides of the North Dock adjacent to the area known as 'The Stage' (Appendix F) are presently silted up and the berths are unusable.

2.1.18 Bailey's dry dock is presently unused.

2.1.19 UKD Dredging carries out maintenance dredging of Newport Docks and the approach channel. UKD Dredging is a division of ABP.

2.2 The River Usk

2.2.1 Newport Harbour Commissioners (NHC) are the Statutory Harbour Authority for the rivers Ebbw, Usk and a designated area of the Bristol Channel. Their jurisdiction extends as laid down in the Newport (Monmouth) Act 1890.

2.2.2 The 1890 Act states the port or harbour of Newport shall be deemed to include those parts of the Bristol Channel and the rivers Usk and Ebbw which lie between an imaginary line drawn in a S 79° W true direction from Gold Cliff until it meets the part of the Bristol Channel eastward of Peterstone Wentlodge Church and the bridge over the river Usk at Newbridge and the bridge carrying the South Wales Railway of the Great Western Railway Company over the river Ebbw and the banks and shores of the said channel and rivers (see Appendix I).

2.2.3 As the Competent Harbour Authority (CHA), NHC are, amongst other things, responsible for the safe navigation of vessels within their jurisdiction, the provision of a pilotage service, wreck removal, hydrographic surveys, and maintenance and dredging of the navigable channel (including marking of the navigable channels with lights and marks) from the South Lock up to the SDR Bridge. The provision of many of these services such as pilotage and vessel traffic management are contracted out to ABP. However, unlike ABP, the Newport Harbour Commissioners do not own or operate any of the quays, wharves or docks that lie within their jurisdiction.

2.2.4 The Port of Newport also includes the commercial wharves and docks on the river Usk (See Appendix K). The wharves and docks on the Usk are privately owned, operated and maintained. Maintenance dredging of the wharves and berths on the river Usk is the responsibility of the berth owner under licence from the NHC.

2.2.5 Newport and Uskmouth Sailing Club is located, as the name suggests, at the mouth of the river Usk and close North East to Uskmouth power station. The club is active with a clubhouse, slips, moorings and pontoons for local and visiting pleasure craft, which include cruising yachts, motor yachts and dinghies.

2.2.6 Liberty Steel wharf is a privately owned berth, located on the eastern side of the river Usk, close north of Saint Julian's Pill. The berth can accommodate dry cargo vessels of up to 30,000 tonnes DWT, providing that such vessels are able to take the ground at low water (i.e. be safely aground alongside the berth at low water).

2.2.7 Birdport Dock is located upstream from the Liberty Steel wharf on the eastern side of the river. The dock is privately owned and operated by Cargo Services (UK) Ltd and handles steel, timber and bulk cargoes. The dock is 225 m long, 19.8m wide with a depth of 8.5m at MHWS and is capable of accommodating vessels of up to 8,000 tonnes deadweight. The dock is equipped with half gates enabling it to maintain a depth of 6.2m when the

gates are closed. As a result of the terminal canopy and gantry crane, there is an air draft restriction of 21.5 m for vessels using the dock.

2.2.8 Eastern Dock is an old dry dock and is located upstream of, and adjacent to Bird Port Dock. Until 2013, the dock was owned and operated by RMC and was used for the discharge of aggregates dredged from defined areas in the Bristol Channel. The dock is presently unused.

2.2.9 Dallimore's Wharf is situated upstream from the Eastern Dock on the eastern side of the river Usk. The wharf is privately operated and conserved by Hanson Aggregates and is presently used to discharge aggregates dredged from designated areas in the Bristol Channel.

2.2.10 Lysaght's Wharf is situated on the eastern bank of the river Usk, approximately 700 m up river of the Transporter Bridge. The wharf is currently unused; according to the ABP vessel data the last time a vessel is reported to have visited the berth was October 2010.

2.2.11 Church Street Wharf (Penmaen Wharf) is owned by Collingbourne Properties and was refurbished in 2007 to accommodate the passenger ships, Waverley and Balmoral. The Balmoral last visited Penmaen Wharf in 2011; since that time there has been no other passenger ship traffic to the berth.

2.3 Tide and Dock Levels

2.3.1 The Bristol Channel has one of the largest tidal ranges in the world. This is due to the unobstructed proximity of the Atlantic Ocean, the funnelling of water by the landmasses in the area and the prevailing south westerly winds. The tides in the Bristol Channel are known as semi diurnal, which means that there are two high and two low waters per day. The semi-diurnal tides times of high and low water and the height of tide can be predicted with a reasonable degree of accuracy and are published in tide tables.

2.3.2 A vessel's draught should be considered for the purposes of navigation and port entry. The draught of a vessel may be defined as the vertical difference between the waterline to the lowest point of the keel.

2.3.3 Depths on British Admiralty Charts are referenced to chart datum, which is approximately equal to the level of the lowest astronomical tide (LAT), as detailed in (see Appendix G). The height of tide at a given point must be added to the corresponding charted depth at that point in order to determine the actual depth of water at that position.

2.3.4 The Port of Newport is dependent upon the high water tide in order to get vessels of a deep draught in and out of the port, as there is very little water in the River Usk at low water.

2.3.5 The harbour master for the Port of Newport publishes allowances for the berths and wharves on the River Usk. It should be noted that the heights computed using the predicted tidal data are not guaranteed, as there are a number of factors that may affect the heights and times of the predicted tides. These factors may cause the tide not to reach the predicted height (the tide has cut) or exceed the predicted height (the tide has made). Similarly the times of high and low water may vary from the published predicted values.

2.3.6 Tidal predictions are based on an average barometric pressure. Meteorological conditions such as low barometric pressure can cause the tides to be higher than predicted and high-pressure systems can cause the tides to be below the predicted height. In the latter case, a maximum draught vessel with a low under keel clearance (UKC) may not have enough water to reach its required destination or clear the dredged channel and it may become necessary for the pilot or master to abort the passage and return the vessel to an anchorage or not leave the berth.

2.3.7 Spring tides occur twice monthly during the new or full moon cycles when the sun, moon and earth are nearly aligned, the combined gravitational pull causes higher high waters and lower low waters.

2.3.8 Neap tides occur seven days after the spring tides when the sun and the moon are at right angles to one another in relation to the earth. During the period of neap tides, higher low waters and lower high waters are experienced.

2.3.9 The relevant Admiralty chart (Ref 10) provides a MHWS height of 12.3m (ACD). The highest recorded level of tide since the year 2000 at Newport was 13.62m (ACD) and this is reported to have occurred on the 8th Oct 2006. The highest astronomical tide predicted from 2008 until 2026 occurred on the 29th September 2015 at a height of 13.36m (ACD), Ref 11, and 13.7m (ACD) in Admiralty Tide Tables (Ref 9).

2.3.10 Water levels in the river Usk and ultimately in the Newport Docks may also be affected by rising sea levels as a result of climate change. Global warming and the effect it may have on sea levels will be dealt with in the Proof of Evidence put forward by Dr. Paul Canning Tidal Flooding (WG 1.16.1), however it is understood that the effects of global warming may account for a rise in sea level of 0.07 m from 2016 until 2030.

3. MARINE CONSIDERATIONS FOR VESSELS VISITING NEWPORT

3.1 The Relationship Between a Vessel's Dimensions and the Port

3.1.1 There are several restrictive parameters that must be considered in order to determine whether a vessel is capable of entering a dock or harbour system like that of Newport. This section provides a detailed explanation of the parameters in relation to Newport Docks.

3.2 Beam

3.2.1 For ship handling and pilotage purposes the beam of a vessel may be defined as the maximum width of a vessel's hull.

3.2.2 The maximum beam of a vessel that a dock and/or lock can accommodate is determined by the width of any locks or the width of a waterway the vessel is required to pass through. An appropriate beam safety margin must also be considered.

3.2.3 At Newport docks the South Lock is 30.5m wide. The beam restriction for vessels entering the South Lock is advised as 28m, however at the discretion of the harbour master, vessels of up to 30.1m beam may be accepted into the lock. Therefore, in this instance, the beam safety margin is 0.4 m.

3.2.4 The waterway connecting the North and South Docks is known as the Junction Cut. It is understood that the Junction Cut is 17.6m wide. The beam restriction for a vessel passing through the Junction Cut is advised as 16m, however, at the discretion of the harbour master, vessels of up to 17.2 m beam may pass through and enter the North Dock. The beam safety margin for a vessel transiting the Junction Cut is therefore 0.4m. See Figure 3-1 below:

Figure 3-1 Junction Cut 29th September 2016.

3.2.5 The width of Bird Port dock situated on the river Usk is 21.33m and the beam restriction for vessels entering the dock is 19.5m.

3.2.6 The maximum allowable beam for vessels berthing at Liberty Steel is published as 26.0m.

3.2.7 There do not appear to be any other beam restrictions on vessels navigating and/or berthing on the wharves and jetties located on the River Usk.

3.3 Length Overall (LOA)

3.3.1 A further restriction on access to a port may be a vessel's length overall (LOA), this is defined as the vessel's extreme length measured from the bow to the stern or vice versa.

3.3.2 The length of the South Lock is 305m but can be divided into two sections by closing the middle lock gates, the shorter of the two sections being 122m in length. Allowing for two manoeuvring tugs fore and aft, the maximum length of vessel that can be accommodated by the South Lock at Newport docks is (as per ABP Acceptance Tables) 244m.

3.3.3 The maximum length of vessel entering the North Dock is 122m. Vessels of lengths greater than 122m may enter the North Dock, subject to the approval

of the Harbour Master. Vessels over 122 m in length would have sufficient space to turn within the North Dock, therefore it is likely that these vessels would need be turned within the South Dock and backed in or backed out of the Junction Cut stern first. The manoeuvre described above may require the assistance of tugs.

3.3.4 According to ABP's Consultation Draft Master Plan 2015 – 2035 the Harbour Authority are planning, within the next five years, to widen the Junction Cut, however, this is understood to be dependent on whether the proposed Scheme goes ahead. Should the proposed Scheme go ahead, ABP would not widen the Junction Cut as the construction of the bridge would preclude large vessels of an air draft of over 25.2m from entering the North Dock. Without the bridge in place, the removal of the western knuckle from the Junction Cut would increase the width of the Junction Cut to allow vessels of a greater beam to enter the North Dock.

3.3.5 Following a widening of the Junction Cut, the beam restriction on vessels entering the North Dock would be removed. The only beam restriction remaining on vessels entering the Newport Docks as a whole, absent the proposed Scheme, would be the 30.1m beam restriction at the South Lock.

3.4 Depths, Dock Levels and Under Keel Clearance

3.4.1 Under keel clearance (UKC) is another important factor and may be defined as the vertical distance from the lowest part of a vessel's keel to the seabed. For example, a vessel of 9 m draught floating in 10 m of water would have a UKC of 1 m. For the Port of Newport it is understood that the minimum UKC set by the relevant Harbour Authority (either ABP for the docks or NHC for the Usk) is 0.5m for the docks and 10% of the vessel's draught for the River Usk.

3.4.2 In their letter dated 26th September 2016 to the Welsh Government, Winckworth Sherwood state that the controlling depth for vessels entering the North Dock is at the Junction Cut and not the Dock itself, and this depth is based on a dock level of 13.55m (ACD) is a 'maximum water level of 8.87m'. Using this depth and applying a 0.5 metre under keel clearance, the maximum draught of a vessel entering the North Dock via the Junction Cut, would be

restricted to 8.37 m. This is an absolute maximum, taken from the information provided by Winkworth Sherwood's letter. Alternative maximum draughts may be calculated if alternative data sources are used, such as the Admiralty Chart (8.20 m) and ABP's Acceptance Tables.

3.4.3 There appears to be a discrepancy between the information provided by ABP and the information advertised to the public. It is noted from the historical vessel data provided by ABP that throughout the data collation period (9th December 2004 to 31st December 2015) a total of 2,876 vessels were recorded for the North Dock, the maximum recorded draught was 7.30 m.

3.4.4 ABP have advised that they are planning to replace the outer South Lock gates at Newport Docks in order to future proof the Docks in the event sea level rises as a result of climate change. It is understood that the replacement of the outer gates is part of an on-going lock gate replacement programme. They have stated that the top level of the new outer gates would be +14.21m (ACD) (0.40m below the dock side coping level 14.61m).

3.4.5 In order to increase the level of water within the Dock, the middle and inner lock gates must also be replaced. ABP have not yet provided a firm indication as to when the inner and middle gates will be replaced.

3.4.6 Providing all the gates within the South Lock are increased to the same height of 14.21 m (ACD), then, in theory it would be possible for the dock water level to be increased to 14.21 m (ACD). In practice however I do not believe this would be possible without further works. Having visited the Docks, I observed that some of the copingstones in the region of the Junction Cut are missing or broken, and will require repair and/or replacement before the dock level can be raised. Please see Figure 3-2 below:

Figure 3-2 Missing Coping Stones - Junction Cut

3.4.7 If the inner, middle and outer lock gates are replaced and adequate repairs are carried out at the Junction Cut coping stones, and water levels are raised from by 7.74 m to 8.40 m (AOD) then, based on the 8.87 m minimum depth provided by ABP the least depth at the Junction Cut would be:

8.87m + (8.40 – 7.74) = 9.53 m

Applying a 0.50 m under keel clearance, the maximum draught acceptable to the North Dock would be 9.03 m.

3.5 Air draft

3.5.1 A possible restriction on entering a port may be a vessel's air draft (see Appendix G). The air draft of a ship may be defined as the distance from the waterline to the uppermost part of the ship (on a cargo vessel this is likely to be the main mast which is usually situated atop the accommodation and wheelhouse superstructure).

3.5.2 The purpose of a vessel's main mast is to carry the main masthead lights, all round lights and signal shapes as required by the International Regulations for Preventing Collisions at Sea 1972 (Colregs). The main mast also provides a platform for mounting radar scanners, the ship's whistle, communication aerials, numerous antennae for navigation instruments and the hoisting arrangements for courtesy and signal flags.

3.5.3 A vessel's air draft is usually only relevant if the vessel is required to pass below overhead obstructions such as bridges or power cables, and is usually calculated by the vessel's master, included on the pilot card and provided to the pilot during the pilot / master exchange, which should take place prior to the commencement of the pilotage passage.

3.5.4 A vessel's air draft would decrease as the draught increases due to ballasting/ loading, and the air draft would increase as the draught decreases due to the discharging cargo or de-ballasting. Therefore, a ship's air draft is usually greatest when the vessel is empty and in the lightship condition. The air draft is least when the vessel is fully laden.

3.6 Water density

3.6.1 Every cargo vessel is given a minimum freeboard limit, equating to a maximum draught limit to which it can load when floating in salt water. This limit can be exceeded depending on the density of the water the vessel is floating in. The density of the water in the North Dock as stated by ABP is 1002 and in the South Dock the density is reported to be 1010 in the South Dock. Therefore a vessel floating in the dock would sit slightly deeper in the water than when it is in salt water at sea.

4. BRIDGE HEIGHT AND NAVIGATIONAL CLEARANCES

4.1 Original Bridge Height at Schedule 3

4.1.1 For navigation purposes, the vertical clearance of bridges, power cables and other overhead obstructions are given on Admiralty Charts and are referenced to highest astronomical tide (HAT). The height of the bridge of the proposed Scheme where it crosses the River Usk has for design purposes been referenced to Mean High Water Springs (MHWS) as this was the convention when the bridge was first proposed. With regards to the Newport Docks however, the bridge vertical height as it passes over the Junction Cut is referenced to a bridge design dock level (NDL).

4.1.2 Under Schedule 3 of the Draft Scheme Order published on the 10th March 2016, the proposed height of the bridge where it crosses the Newport Docks at the Junction Cut and the River Usk were as tabulated below:

Table 4-1 Proposed bridge clearance at Schedule 3

Location	Design Bridge Height (AOD)	Water Level (AOD)	Safety Clearance	Maximum Air Draft
ABP Dock	33.06m	7.56m	0.3m	25.2m
River Usk	38.49m	6.49m	1m	31m

4.1.3 I was not involved in the decision making process for determining the bridge height as this predated my appointment. Mr Matthew Jones sets out in his Proof of Evidence Chief Witness (WG 1.1.1) the history of the decision making that lead to the adoption of this height as an appropriate height for the bridge.

4.2 Raised dock water level

4.2.1 Since the publication of the Draft Scheme Order, ABP have informed the Welsh Government that the present dock water level is maintained at a height of approximately 7.74 m (AOD), which is higher than the design height of 7.56 m (AOD) originally used by the Welsh Government.

4.2.2 Moreover, ABP have also informed the Welsh Government of their proposals to provide new outer lock gates, which would (providing the middle and inner gates are also changed and works are carried out to repair the dock copings in places) raise the dock water level to 8.40 m (AOD).

4.2.3 It is unclear when ABP propose to change the middle gates and the inner gates and repair dock copings. Until such a time as this is done it will not be possible to increase the dock level to the proposed maximum of 8.40 m (AOD) or 14.21 m (ACD). Until the inner lock gates are changed to the same height as the outer lock gate and copingstones are repaired, the dock level would remain at the present normal dock level of 7.74 m (AOD) or 13.55 m (ACD).

4.3 Revised Safety Margins

4.3.1 As set out above in Table 4-1, at the time of the publication of the draft Scheme Orders, safety margins for ships passing under the bridge of 0.3 m for Newport Docks and 1.0 m for the River Usk were considered to be acceptable. I was not involved in recommending these safety margins. Since the publication of the Draft Scheme Order, and following discussion with ABP, the recommended safety margins have been reassessed.

4.3.2 In recommending a reasonable safety margin, I have been assisted by guidance on air drafts and air draft safety clearances provided by Det Norske Veritas (DNV). DNV provide guidance for marine warranty purposes and the transportation by ship of offshore project cargoes in recommending an air draft safety clearance of 1.0 m. Offshore Standard DNV-OS-H202 Sea Transport Operations at paragraph 2.3.5.1 sets out “When passing under bridges and power cables, the overhead clearance shall be calculated allowing a margin of not less than 1.0 m”. The guidance also recognise that this should account for applicable effects including wind effect, wave effects and other hydrodynamic considerations.

4.3.3 The environment within the dock is enclosed and as such does not allow the build up of waves or swell to the same extent that you would find at sea, in river or an estuary. Also the height of the dock water level is accurately

known and is not affected by the tide. I have therefore recommended a reasonable air draft safety clearance of 1.0 m to the Scheme designers for vessels passing beneath the bridge in the Docks.

4.3.4 For the river Usk I have recommended a reasonable air draft safety clearance of 1.5 m for passing vessels. This is greater than within Newport Docks, after taking into account the hydrodynamics of the tidal river. This safety margin is consistent with the M5 Bridge crossing on the river Avon.

4.4 Revised Bridge height

4.4.1 The Welsh Government has acknowledged the reasoning provided by ABP for increasing the design dock water level to 8.40 m AOD.

4.4.2 The Welsh Government have also reassessed the original proposed safety clearance of 0.3 m within the Docks and accepted my advice that this should be increased to a minimum of 1.0 m.

4.4.3 In order to account for these two changes and to maintain the navigation clearance of 25.2 m at the Junction Cut the proposed bridge has been lifted by 1.54 m across both the Docks and the River Usk, to 34.60 m AOD at the Junction Cut and 40.03 m AOD over the River Usk.

4.4.4 A supplementary Scheme Order with an amended Schedule 3 was published on 14th December 2016 to reflect the Welsh Government's decision to raise the design height of the bridge.

4.5 Navigation Clearance

4.5.1 With the new dock levels, bridge height and safety clearance, the navigation envelope, which dictates the restrictions on shipping, can be determined.

4.5.2 Until all the lock gates are replaced and coping stones repaired, the present dock level will remain and the navigation envelope will be 25.86 m. Once the inner lock gates are replaced and dock copings are repaired, if water levels are raised, the navigation envelope would reduce to 25.2 m.

Table 4-2 Proposed Bridge Air Draft Clearances at Junction Cut

	Design Bridge Height	Design Water Level (AOD)	Safety Clearance	Maximum Air Draft
Raised Bridge, present inner lock gates	34.60m	7.74 m	1.0 m	25.86 m
Raised Bridge, proposed lock gates	34.60m	8.40 m	1.0 m	25.2 m

4.5.3 The proposed River Usk crossing, will provide navigation envelope is as detailed in Table 4-3 below:

Table 4-3 River Usk Crossing Heights and Clearances

	Design Bridge Height (AOD)	Design Water Level (AOD)	Safety Clearance	Maximum Air Draft
Raised Bridge	40.03m	6.49 m	1.5 m	32.04 m

5. RESTRICTIONS IMPOSED BY THE PROPOSED SCHEME

5.1 Overview

5.1.1 In this section, I present analysis of the historical vessel movements and of the vessels which have visited the North Dock in order to establish whether there would be any restrictions to vessel movements as a result of the proposed Scheme. In doing this, I used shipping data provided Associated British Ports to the Welsh Government on 29th April 2016. I have also used commercially available information on the vessels to help with my assessment and where required, made private enquiries to validate the ABP data.

5.1.2 The data provided by ABP covers the period from 9th December 2004 until 31st December 2015 (approximately 11 years and one month) and contains 26,771 entries. The data covers the Newport Docks and also the berths, docks and wharves on the River Usk. The data recorded includes the name of the vessel, the vessel IMO number, the vessel movement (IN or OUT), the date of record, the location within the port, the vessel particulars (vessel length, beam and the Gross Tonnage), vessel draught, air draft, the ship type, ship category and 'Berth Original', which gives extra information on the berthing location of the vessel. This data allowed for an assessment to be made on the potential impact of the proposed Scheme on vessel operations at the ABP Newport Docks and in the River Usk.

5.1.3 The ABP data received did not provide the vessel deadweight, therefore in order to allow for a better understanding of any restriction that the Scheme may impose on vessels in terms of cargo carrying capacity, I have populated the dataset with the vessel deadweight from a commercially available source (IHS Maritime Sea-web database). The database used contains critical information on over 180,000 vessels.

5.1.4 In order to focus my assessment on cargo ships, I have excluded working vessels such as tugs, UKD dredgers etc. from the ABP data.

5.1.5 Table 5-1 shows a breakdown of the movement data for the different locations. The data is presented for all vessels ('including working vessels') and for cargo vessels only ('excluding working vessels').

Table 5-1 Breakdown of movement records

Location	Including working vessels					Excluding working vessels				
	Total	IN	OUT	SHIFT	NA	Total	IN	OUT	SHIFT	NA
North Dock	3,052	1,440	1,610	1	1	1,007	525	481	1	0
South Dock	12,361	6,104	6,253	4	0	8,944	4,475	4,465	4	0
River Usk	7,299	3,707	3,588	4	0	3,762	1,914	1,844	4	0
NA	3,276	1,643	1,593	40	0	46	4	2	40	0
Unknown	720	380	338	0	2	1	1	0	0	0
Docks Unknown	63	37	26	0	0	0	0	0	0	0
Totals	26,771	13,311	13,408	49	3	13,760	6,919	6,792	49	0

5.1.6 During the recording period, there were 525 'IN' movements and 481 'OUT' movements for the North Dock. 431 complete records could be matched. 92 visits had an 'IN' entry and were missing an 'OUT' entry. 50 visits had an 'OUT' entry and were missing an 'IN' entry. The total number of visits by vessels to North Dock from the data was therefore 573 (431+92+50).

5.1.7 For the South Dock, there were 4475 'IN' movements and 4465 'OUT' movements. 3727 complete records could be matched. 801 visits had an 'IN' entry and were missing an 'OUT' entry. 795 visits had an 'OUT' entry and were missing an 'IN' entry. The total number of visits by vessels to South Dock from the data was therefore 5323 (3727+801+795).

5.1.8 The number of visits to the North and South Docks for each year are tabulated below. The year 2004 was not included in the table below as the data only covered the month December of that year. As can be observed in Table 5-2, the North Dock handles significantly less vessels than the South Dock.

Table 5-2 Annual Visits

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
South Dock	603	653	583	531	445	399	387	389	382	458	465
North Dock	67	85	78	52	49	39	43	25	34	41	55

5.1.9 The **568** visits to the North Dock during the tabulated period were made by a total of **313** unique vessels, some visiting the dock more than once.

5.1.10 The list of vessels that have visited the North Dock during the data recording period is appended to this Proof of Evidence.

5.1.11 As previously discussed, two distinct scenarios exist for the air draft limit, depending on whether new heightened lock gates are installed. I have therefore carried out my assessment for two scenarios as shown below:

a) A 25.2m air draft limit that would be experienced if the dock level was raised to account for climate change.

b) A 25.86m air draft limit in the scenario where the maximum dock level remains unchanged.

5.2 Air draft data

5.2.1 A parameter crucial to this assessment is the vessels' air draft. As previously defined, the air draft of a ship may be defined as the distance from the waterline to the uppermost part of the ship (on a cargo vessel this is likely to be the main mast which is usually situated atop the accommodation and wheelhouse superstructure). The air draft will change depending on the extent to which the ship is loaded and the density of the water. The most relevant air draft is that when the ship has unloaded its cargo, as the air draft will be at its maximum.

5.2.2 In carrying out my assessment, I have conservatively not accounted for increases to a vessel's draught, and consequently a decrease in a vessel's air draft, as a result of a change in the water density when transiting from a salt water environment to a dock water environment.

5.2.3 The ABP data provided an air draft height for each vessel, and it is understood that these were the air drafts of the vessels reported to Cardiff LPS and/or the Lock Controller at Newport Docks.

5.2.4 From my personal experience as a marine pilot, having piloted a number of the vessels listed in the ABP dataset, I recalled that a number of the vessels listed did not have an air draft as recorded.

5.2.5 I illustrate the discrepancies in the data by using the example of the SCOT MARINER (IMO 9243916), the vessel was the most frequent visitor to the North Dock during the recording period. The data showed that the vessel had been berthed on some 32 occasions at Section 23 within the North Dock.

5.2.6 It was noted that air draft values for the outward movement ranged from between 21.5 m and 26.0 m, using these air draft values, on some occasions the vessel would be impeded by a proposed 25.2 m air draft restriction for the North Dock.

5.2.7 The discrepancies in the ABP data can be readily seen if the height of the ship is calculated by adding together both the recorded draught and air draft. The keel to mast figure is a fixed dimension on a vessel and does not vary regardless of variations in the draught and the air draft, however in the data provided by ABP, the figures for Scot Mariner, varied between 25.7 m and 30.0 m, see below:

Table 5-3 Scot Mariner ABP Recorded Draughts, Air drafts and Keel to Mast Heights

No.	Date	Movement	Draught (m)	Air draft (m)	Keel to top of main mast (m)
1	13/12/04	Out	4.8	22.0	26.8
2	08/06/05	Out	4.4	25.5	29.9
3	05/07/06	Out	4.0	26.0	30.0
4	22/02/07	Out	3.7	22.0	25.7
5	03/04/07	Out	4.3	21.5	25.8
6	13/07/07	Out	4.5	25.0	29.5
7	31/07/07	Out	4.0	26.0	30.0
8	17/09/07	Out	4.0	26.0	30.0
9	10/06/10	Out	4.0	23.0	27.0
10	12/12/11	Out	4.5	23	27.5
11	19/06/12	Out	3.8	23	26.8

No.	Date	Movement	Draught (m)	Air draft (m)	Keel to top of main mast (m)
12	17/09/12	Out	4.8	23	27.8
13	15/10/13	Out	4.5	23	27.8
14	04/06/14	Out	3.8	23	26.8

5.2.8 As stated earlier the keel to mast dimension is fixed and does not change, however using the ABP data and adding the draught to the air draft, in the case of the Scot Mariner this figure was clearly changing. The tabulated data above called into question the accuracy and validity of the recorded draught and air draft values in the ABP data. These anomalies in the data prompted me to conduct an air draft survey of all the vessels listed, in order to ensure that an accurate assessment of the impacts of the proposed bridge could be carried out.

5.2.9 The survey consisted of researching each of the vessels for their specification and, when public information has not been available, vessel operators were contacted directly.

5.2.10 In some cases the vessel's maximum air draft was calculated from their general arrangement plans. In some cases, the vessels have also been assessed to take into account their design and construction. For instance, some vessels are designed with telescopic bridges and collapsible masts, in which case the more appropriate lower air draft figures were used. These vessels are known as sea / river ships and are purposely designed to visit tidal ports and waterways where air draft restrictions are in place. The list of vessels and the verified air drafts is provided in Appendix M.

5.2.11 My research concluded that in 47 cases, the vessel ballast air draft was more than the value reported by ABP and, in 176 cases, the actual ballast air drafts of the vessels was less than the value reported by ABP.

5.2.12 I have therefore used the verified data on vessel air drafts to assess the number of vessels and the number of vessel visits that would be restricted from entering the North Dock with the proposed Scheme in place. I have also

presented the results, using the unverified ABP data for comparison purposes, although I do not believe that to be an accurate representation.

5.3 Percentage of visits impeded

5.3.1 Taking into account the present dock level (7.74m AOD), using ABP unverified air draft data, 239 vessels were found to be impeded. This corresponds to **42%** of visits. As above, I do not believe that to be accurate for the reasons I have explained. Using the more accurate verified air draft data, this percentage reduces to **17%** (99 visits impeded).

Table 5-4 Impeded visits (Present Dock Levels)

Assessment of potentially impeded vessel visits - 25.86m maximum air draft												
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Number of vessel visits	67	85	78	52	49	39	43	25	34	41	55	568
ABP unverified Data												
Number of visits impec	20	33	37	25	23	14	15	16	14	16	26	239
Percentage Impeded	30%	39%	47%	48%	47%	36%	35%	64%	41%	39%	47%	**42%**
Verified air draft data												
Number of visits impec	7	19	19	8	7	6	2	4	6	11	10	99
Percentage Impeded	10%	22%	24%	15%	14%	15%	5%	16%	18%	27%	18%	**17%**

5.3.2 Taking into account a raised dock level of 8.40m AOD, of the 568 visits made to the North Dock during the eleven year period, using the ABP data, unadjusted for the anomalies presented above, 242 visits would have been impeded by the proposed Scheme. This corresponds to **43%** of the visits. As above, I do not believe this to be accurate, for the reasons I have explained. Using the more accurate adjusted air draft data, it was found that this percentage is reduced **24%** (138 impeded visits).

Table 5-5 Impeded visits (Raised dock water level)

Assessment of potentially impeded vessel visits - 25.2m maximum air draft												
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Number of vessel visits	67	85	78	52	49	39	43	25	34	41	55	568
ABP unverified Data												
Number of visits impeded	21	34	38	25	23	14	15	16	14	16	26	242
Percentage Impeded	31%	40%	49%	48%	47%	36%	35%	64%	41%	39%	47%	**43%**
Verified air draft data												
Number of visits impeded	10	20	23	14	12	7	8	12	7	14	11	138
Percentage Impeded	15%	24%	29%	27%	24%	18%	19%	48%	21%	34%	20%	**24%**

5.4 Percentage of unique vessels impeded

5.4.1 The 568 visits to the North Dock during the eleven year period were made by 313 unique vessels.

5.4.2 Taking into account the present dock level Table 5-6 considering the vessel movement data for the 11 year period and using ABP's unverified air draft data, 106 vessels would be impeded by the Scheme. This equates to **33%**. Again, I do not believe this to be accurate representation for the reasons I have explained earlier. When the more accurate verified air draft data is used, this percentage is falls to **19%** (with 61 impeded vessels).

Table 5-6 Impeded Unique Vessels (Present Dock Levels)

Impeded unique vessels - 25.86m maximum air draft												
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2005 -2015**
Number of unique vessels	54	75	61	44	35	28	35	16	21	28	40	313
ABP unverified data												
Number of vessels impeded	17	29	27	18	13	9	11	8	7	8	19	104
Percentage Impeded	31%	39%	44%	41%	37%	32%	31%	50%	33%	29%	48%	33%
Verified air draft data												
Number of vessels impeded	6	17	18	8	5	5	2	3	3	7	8	61
Percentage Impeded	11%	23%	30%	18%	14%	18%	6%	19%	14%	25%	20%	19%

5.4.3 Taking into account a raised dock level, considering the vessel movement data for the eleven year period and using ABP's unverified air draft data, 106 unique vessels would be impeded by the Scheme. This equates to **34%**. As above I do not believe this to be an accurate assessment. When using the more accurate verified air draft data, the number of impeded vessels was calculated to be 71, which equates to approximately **23%** of the total number of unique vessels that have visited the North Dock during the data collation period.

Table 5-7 Impeded Unique Vessels (Increased Dock Levels)

Impeded unique vessels - 25.2m maximum air draft												
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2005 -2015**
Number of unique vessels	54	75	61	44	35	28	35	16	21	28	40	313
ABP unverified data												
Number of vessels impeded	18	30	28	18	13	9	11	8	7	8	19	106
Percentage impeded	33%	40%	46%	41%	37%	32%	31%	50%	33%	29%	48%	34%
Verified air draft data												
Number of vessels impeded	9	18	22	11	8	6	4	6	4	8	9	71
Percentage impeded	17%	24%	36%	25%	23%	21%	11%	38%	19%	29%	23%	23%

5.5 Restrictions on Cargo Carrying Capacity

5.5.1 In order to assess the restriction in terms of cargo carrying capacity, I have examined the impeded vessels in more detail. In particular, I have examined a breakdown of the vessels calling at the North Dock in terms of their deadweight tonnage (DWT). The vessel deadweight information was not contained within the ABP vessel movement data, I have therefore populated the vessel data with deadweight figures using proprietary vessel data sources.

5.5.2 In the following tables, I show the number of vessels that would and would not be impeded by the proposed Scheme, for a range of deadweight. This analysis assumes that the dock levels are raised, restricting vessels transiting to and from the North Dock to a maximum air draft of 25.2 m. The analysis was also undertaken using the present dock water levels restricting vessels to transiting to and from the North Dock to a maximum air draft of 25.86 m.

5.5.3 I have conducted this exercise using both ABP's original air draft data, and using the more accurate verified air draft data.

Table 5-8 Scenario 1: Number of vessel impeded and unimpeded entering the North Dock by the proposed bridge following a rise in dock water level.

UNIQUE VESSELS **ABP Unadjusted Air Draft Data – Raised Dock Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
0	1000	1	1	50%	50%
1000	2000	5	30	14%	86%
2000	3000	23	62	27%	73%
3000	4000	26	77	25%	75%
4000	5000	33	27	55%	45%
5000	6000	12	6	67%	33%

UNIQUE VESSELS **ABP Unadjusted Air Draft Data – Raised Dock Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
9000	10000	0	0	0%	0%
	Total	106	207	34%	66%

Table 5-9 Number of vessels impeded and unimpeded from entering the North Dock by the proposed bridge following a rise in the dock water level.

UNIQUE VESSELS **Adjusted Air Draft Data – Raised Dock Water Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
0	1000	0	2	0%	100%
1000	2000	1	34	3%	97%
2000	3000	8	77	9%	91%
3000	4000	16	87	16%	84%
4000	5000	30	30	50%	50%
5000	6000	10	8	56%	44%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%

UNIQUE VESSELS **Adjusted Air Draft Data – Raised Dock Water Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
9000	10000	0	0	0%	0%
	Total	71	242	23%	77%

Table 5-10 Number of vessels impeded and unimpeded from entering the North Dock by the proposed bridge with present dock water levels.

UNIQUE VESSELS **ABP Unadjusted Air Draft Data – Present Dock Water Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
0	1000	1	1	50%	50%
1000	2000	4	31	11%	89%
2000	3000	23	62	27%	73%
3000	4000	26	77	25%	75%
4000	5000	33	27	55%	45%
5000	6000	11	7	61%	39%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	104	209	33%	67%

Table 5-11 Number of vessels impeded and unimpeded from entering the North Dock by the proposed Scheme with present dock water levels.

UNIQUE VESSELS **Verified Air Draft Data – Current Water Levels**					
Deadweight range in tonnes		No. of vessels impeded	No. of vessels unimpeded	% Vessels impeded	% Vessels unimpeded
0	1000	0	2	0%	100%
1000	2000	1	34	3%	97%
2000	3000	7	78	8%	92%
3000	4000	13	90	13%	87%
4000	5000	26	34	43%	57%
5000	6000	8	10	44%	56%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	61	252	19%	81%

5.5.4 Using the verified data, which I believe to be the more accurate, from deadweight range 0 – 4000 tonnes DWT, it is clear that the majority of vessels would be unimpeded by the proposed Scheme. This is the case for both Dock water level scenarios. For vessels between the deadweight range of 4000t and 5000t, the analysis shows approximately an equal split between unimpeded and impeded vessels. This analysis suggests that there are alternative vessels available for charter within this deadweight range, which would be able to access North Dock, with the Scheme in place. Again, this remains the case for both Dock water level scenarios.

5.5.5 Owing to the low numbers of vessels historically entering the North Dock with a deadweight above 5000 tonnes, I am unable to draw a firm conclusion as to whether alternative vessels with a low enough air draft to pass safely under the proposed bridge would be available for charter.

5.5.6 My conclusions on the availability of alternative vessels available for charter are supported by consideration of the Lady Ariane that I observed visiting Newport North Dock on the 8th September 2016. This is a sea/river vessel, which as explained above has a telescopic bridge and collapsible masts.

5.5.7 The above class of vessel is commonly used within North Western Europe area, on short sea trade voyages from Europe to the United Kingdom and often visit the Port of Newport. These vessels are highly manoeuvrable, with low air draft and draught and are therefore ideal for transporting cargoes on tidal rivers and estuaries and are also ideal for use where there is an air draft restriction. Their high manoeuvrability and smaller physical size precludes them from requiring tugs and allows them to enter locks and docks whilst the tide is still running, thus leaving the high water slack tide period for larger ‘passage plan’ vessels to enter the lock. Indeed I have personally piloted many vessels of this design at all states of tide, on a tidal estuary where the air draft restriction was a bridge of 29.0 m (above HAT).

5.5.8 The vessel dimensions of the Lady Ariane are as follows, DWT 3,000 tonnes, LOA = 88.0 m Breadth = 13.39 m, summer draught 4.9 m and ballast air draft

of 8.50 m. This particular vessel was built in 2015 and the sister vessels of the same dimensions were built as follows.

Table 5-12 Newly built fleet Wijnne Barends vessels

Number	**Name of Vessel**	**Year Built**
1	Lady Anna	2012
2	Lady Alexandra	2012
3	Lady Amalia	2012
4	Lady Aneke	2012
5	Lady Ama	2015
6	Lady Adele	2015
7	Lady Anne Beam	2016
8	Lady Alida	2016
9	Lady Ariette	2016

Table 5-13 Newly built fleet Wijnne Barends vessels

Number	Name of Vessel	Year Built
1	Lady Anna	2012
2	Lady Alexandra	2012
3	Lady Amalia	2012
4	Lady Aneke	2012
5	Lady Ama	2015
6	Lady Adele	2015
7	Lady Anne Beam	2016
8	Lady Alida	2016
9	Lady Ariette	2016

5.5.9 The number of sister ships recently built, and the date of their construction, gives an indication that such ships are readily available for charter.

5.5.10 A further example of a vessel that has visited Newport Docks with a specially designed low air draft (collapsible main mast) but with a greater deadweight is the St. Constantine (IMO 9203710) DWT = 4520 tonnes, LOA = 103.23 m, breadth = 16.2 m, draught = 4.3 m air draft = 24 m (see Appendix L for a photograph of the vessel with the main mast down). This example shows that there are vessels are available within a deadweight range that could access North Dock unimpeded by the scheme.

5.5.11 However, I do accept that from the ABP historical data, the number of vessels between the deadweight ranges 5,000 to 6,000 and 6,000 to 7,000 tonnes, visiting North Dock was comparatively low when compared to the smaller ships and this could make any conclusion on whether alternative vessels may be available inaccurate. I therefore assume, on a precautionary basis that no alternative charter arrangements would be available for those vessels exceeding DWT and that vessels of this deadweight and above would not be able to access North Dock with the Scheme in place. This is a precautionary assessment since analysis of the historical data shows that some ships of that size were not impeded by the Scheme.

5.5.12 Further investigation was made into the percentages of visits potentially impeded by the Scheme. This is presented in the following tables for ABP verified and unverified air draft data. It is also presented for a raised dock water level following replacement of lock gates and for the present dock water level.

5.5.13 Considering the above assumption that vessels over 5,000 tonnes cannot be chartered with a low enough air draft to pass under the proposed bridge, a total of 32 visits would have been impeded by the Scheme. This corresponds to approximately 5.6% of the visits to the North Dock during the eleven-year period.

Table 5-14 Number of visits impeded and unimpeded from entering the North Dock by the proposed bridge following a rise in the dock water level

Vessel Visits **ABP Unadjusted Air Draft Data – Raised Dock Levels**					
Deadweight range in tonnes		No. of visits impeded	No. of visits unimpeded	% Visits impeded	% Visits unimpeded
0	1000	1	1	50%	50%
1000	2000	6	65	8%	92%
2000	3000	48	110	30%	70%
3000	4000	121	98	55%	45%
4000	5000	52	39	57%	43%
5000	6000	14	8	64%	36%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	248	325	43%	57%

Table 5-15 Number of visits impeded and unimpeded from entering the North Dock by the proposed bridge following a rise in the dock water level

Vessel Visits **Adjusted Air Draft Data – Raised Dock Levels**					
Deadweight range in tonnes		**No. of visits impeded**	**No. of visits unimpeded**	**% Visits impeded**	**% Visits unimpeded**
0	1000	0	2	0%	100%
1000	2000	2	69	3%	97%
2000	3000	12	146	8%	92%
3000	4000	59	160	27%	73%
4000	5000	48	43	53%	47%
5000	6000	13	9	59%	41%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	140	433	24%	76%

Table 5-16 Number of visits impeded and unimpeded from entering the North Dock by the proposed bridge with present dock water level

Vessel Visits **ABP Unadjusted Air Draft Data – Present Dock Levels**					
Deadweight range in tonnes		**No. of visits impeded**	**No. of visitsunimpeded**	**% Visits impeded**	**% Visits unimpeded**
0	1000	1	1	50%	50%
1000	2000	4	67	6%	94%
2000	3000	48	110	30%	70%
3000	4000	121	98	55%	45%
4000	5000	52	39	57%	43%
5000	6000	13	9	59%	41%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	245	328	43%	57%

Table 5-17 Number of visits impeded and unimpeded from entering the North Dock by the proposed bridge with present dock water level

Vessel Visits **Adjusted Air Draft Data – Present Dock Levels**					
Deadweight range in tonnes		**No. of visits impeded**	**No. of visits unimpeded**	**% Visits impeded**	**% Visits unimpeded**
0	1000	0	2	0%	100%
1000	2000	2	69	3%	97%
2000	3000	11	147	7%	93%
3000	4000	36	183	16%	84%
4000	5000	35	56	38%	62%
5000	6000	11	11	50%	50%
6000	7000	4	4	50%	50%
7000	8000	1	0	100%	0%
8000	9000	1	0	100%	0%
	Total	101	472	18%	82%

6. ASSESSMENT OF BERTH OCCUPANCY

6.1 Overview

6.1.1 In this section, I provide a detailed assessment of the historical utilisation of the ABP Common User Berths within the Newport Docks. The objective was to assess whether there is sufficient berth capacity within the South Dock in order to accommodate vessels that may be unable to access the North Dock as a result of the air draft restriction or when alternative charter party arrangements could not be made.

6.1.2 I conducted my assessment using three approaches, as detailed below:

1. My first approach was to estimate the historical berth occupancy for each common user berth in South Dock by using the historical movement data. This does not take into account the length of the quay and the possibility that more than one vessel can berth at the same quay.
2. My second approach was to quantify the unused length of quay frontage for the common user berths in the South Dock. I express this length in terms of the number of vessels typical to the North Dock that can be accommodated in the free space. I also estimate the 'demand' for this quay space from North Dock vessels by studying the historical berth occupancy of the North Dock.
3. My third approach was to consider a scenario where during the study period (2005-2015), vessels exceeding 5,000 tonnes deadweight, which would be impeded by the Scheme, are relocated to the South Dock and test whether they can be accommodated.

6.1.3 Note that my assessment considers the availability of berth frontage only and does not cover onshore considerations such as storage space and crane availability etc.

6.2 ABP Common User Berths

6.2.1 The Newport Docks consist of a number of 'leased' and 'common user' berths. The leased berths are exclusive to the tenant and have therefore been

excluded from this assessment. The common user berths, total 833m of berth space in the South Dock and 739m of berth space in the North Dock. The common user berths are managed and owned by ABP and provide the 'pool' of quay frontage available for cargo vessels loading or discharging various cargos at the Docks. Please refer to Appendix F.

6.2.2 ABP common user berths in the North Dock cover Sections 21 and 22 (informally referred to as Dowd's North Dock) and Sections 23, 24, 25 and 26 (informally referred to as Jewson's').

6.2.3 In the South Dock, the common user berths are Sections 1- 4 (ABP South Quay Steel) and Sections 7-9 (ABP North Quay).

6.2.4 Sections 11 and 12 in the South Dock are commonly referred to as 'Middle Quay' and are managed by ABP. From my meeting with ABP on the 8th of July 2016, I am aware that this berth space is not used for cargo handling due to the poor state of the quayside. This quay is used primarily for laying up vessels or berthing cruise vessels and warships.

6.2.5 If a vessel which is intended to berth at one of the common user berths in the North Dock (Sections 21-26), is impeded by the proposed bridge over Junction Cut, then the vessel would have to be accommodated on one of the common user berths in the South Dock (Sections 1-4 and 7-9).

6.2.6 The four lengths of berth space relevant to this assessment are tabulated below:

Table 6-1 Quay space

Section	Berth name	Dock	Length (m)
Sections 21, 22	Dowds	North Dock	275
Sections 23 - 26	Jewson	North Dock	464
Sections 1 - 4	ABP South Quay	South Dock	604
Sections 7-9	ABP North Quay	South Dock	290

6.3 Vessel movement Data

6.3.1 For this assessment, the historical vessel movement data from 2005 to 2015, provided by ABP, that I have previously used to estimate the impact of the Scheme on shipping, was again used.

6.3.2 This data is described in Table 6-2 for the four lengths of common user berths under consideration. ‘IN’ entries refer to inward movement. I have assumed that it refers to the time when the berth becomes occupied. ‘OUT’ refers to outward movements. I assumed that it refers to the time at which the berth is released and free for use by another vessel.

6.3.3 Complete visit records refer to cases where an IN movement could be matched to an OUT movement, therefore providing complete information on a particular vessel visit.

6.3.4 Incomplete visit records refer to entries where an OUT movement could not be matched to an IN movement and vice versa.

Table 6-2 Vessel Movement 2005 – 2015

Berth	Total number of entries	Number of "IN" entries	Number of "OUT" entries	Number of complete visit records	Number of incomplete visit records	Number of vessel visits
ABP South Quay	2079	1017	1062	886	307	1193
ABP North Quay	1874	966	908	806	262	1068
Dowds	459	247	211	193	73	266
Jewsons	545	275	270	247	51	298

6.3.5 For the 'incomplete visit records', an assumption had to be made as to the vessel's duration of stay at the berth so that a complete record could be constructed.

6.3.6 The data on vessels' time alongside from the 'complete visit records' to the ABP Common User berths provided a means to estimate the time alongside for vessels of different sizes. Average visit duration periods were calculated for vessels of differing deadweight ranges and tabulated as follows:

Table 6-3 Average vessel visit durations

Deadweight Range (tonnes)		Average visit duration (days)
0	1000	3
1000	2000	3
2000	3000	3
3000	4000	3
4000	5000	4
5000	6000	4
6000	7000	4
7000	8000	4
8000	9000	5
9000	10000	5
10000	15000	5
15000	20000	6
20000	25000	6
25000	30000	6
30000	35000	7
35000	40000	8

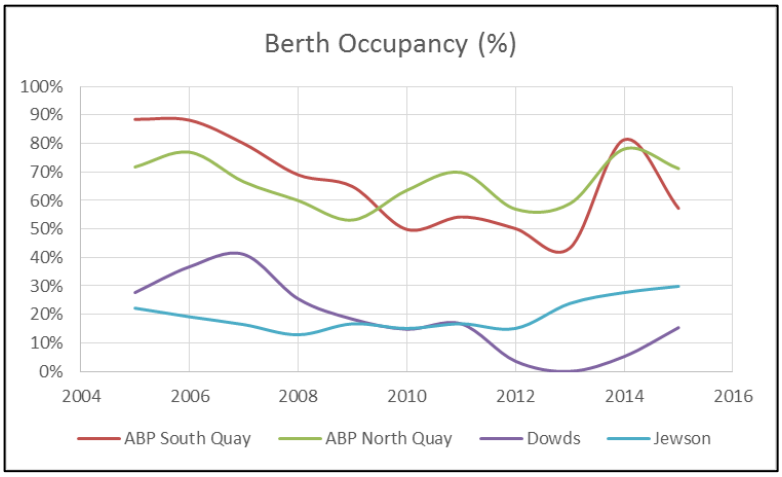
6.4 Berth Occupancy

6.4.1 Using the data for the eleven year period, it was possible to determine the amount of time, during which a vessel was berthed at each of the four common user berths. This information is presented as percentages in the table and graph below:

Table 6-4 Berth Occupancy (%)

Berth Occupancy (%)											
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
ABP South Quay	88%	88%	80%	69%	65%	50%	54%	50%	43%	81%	57%
ABP North Quay	72%	77%	67%	60%	53%	64%	70%	57%	59%	78%	71%
Dowds	28%	37%	41%	25%	18%	15%	17%	4%	0%	5%	15%
Jewson	22%	19%	16%	13%	17%	15%	17%	15%	24%	28%	30%

Figure 6-1 Berth Occupancy



6.4.2 Since the berth occupancy calculated here does not take into account the length of the berthed vessel, it does not give an indication of the availability of quay space. It nevertheless provides some insight into the operations at the ABP common user berths.

6.4.3 As can be observed, the occupancy of the Dowds' and Jewson berths within the North Dock are relatively low compared to the occupancy of the berths within the South Dock.

6.5 Availability of Berth Space within the South Dock

6.5.1 This section quantifies the unused length of berth space at the ABP North and South Quays, which are the two common user berths within the South Dock.

6.5.2 In order to estimate the unoccupied length of berth space required on any given day during the study period, an assumption was made as to the length of quayside required by any vessel. It was assumed that each vessel requires 1.2 x LOA of the vessel as per Ref 12. This figure provides an allowance for vessel moorings, for example, a 200m long vessel will require 240m (200m x 1.2) of quay space. If the same vessel is berthed at ABP South Quay, which is

604m long, then the unused space, available for other vessels, would be 364 m (604m - 240m).

6.5.3 In order to relate the berth space to North Dock traffic, an assumption also made as to how much berth space a vessel typical of the North Dock would require. The longest vessel to have visited the North Dock during the data collation period, was the Sormovskiy 3052 (IMO 822379). This vessel had a length overall (LOA) of 119.2 m and a beam of 13.0 m. On a precautionary basis, using this length as a representative of the berth space required, factoring in the additional length of quay space required for moorings, as described above, it was estimated, that a quay length of 144 m would be sufficient to accommodate one vessel typical of those having visited the North Dock. Similarly, 288 m of quay space would be able to accommodate two vessels, and so on.

6.5.4 The table below presents the percentage of time when the common user berths in the South Dock would have been able to accommodate a certain number of 'North Dock' vessels. The availability of berth space has been expressed in terms of the number of North Dock vessels that can be accommodated (in multiples of 144m). For example, during the year 2013, 96% of the time, there was enough space to berth two vessels.

Table 6-5 Quay Space Available

Quays space availability for North Dock Vessels											
No of vessels	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
1	95%	88%	94%	99%	98%	99%	99%	97%	99%	92%	94%
2	78%	69%	82%	93%	94%	96%	93%	95%	96%	74%	82%
3	52%	45%	58%	73%	82%	84%	79%	84%	84%	50%	63%
4	24%	24%	33%	53%	58%	64%	57%	59%	65%	22%	48%
5	8%	7%	12%	20%	26%	31%	28%	37%	41%	8%	26%
6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

6.5.5 The average percentage availability of berth space compared to the number of vessels is presented in Table 6-6 below:

Table 6-6 Average Berth Availability

Quay Space (No of vessels)	Availability (%)
1	96%
2	87%
3	68%
4	46%
5	22%
6	0%

6.5.6 In order to assess the ability of the South Dock to accommodate North Dock vessels impeded by the Scheme, it was important to obtain an understanding of the potential 'demand' for the available berth space in the South Dock at any one time. As previously determined, I have made a conservative assumption for the purposes of the analysis that all vessels of 5,000 tonnes and over would be restricted by the Scheme and need to be berthed at the common user berths within the South Dock.

6.5.7 I have analysed the data on vessel visits to the Dowds' and Jewson's berths within the North Dock (see Table 6-7 below). The table shows that there was rarely more than one vessel which would have be impeded by the Scheme berthed in the North Dock. The 'demand' for berth space in the South Dock is therefore low.

Table 6-7 Frequency of Number of Vessels within the North Dock

No of vessels >5000t DWT	Occurrence (days)	Percentage (%)
0	3920	97%
1	119	3%
2	1	0%
3	0	0%
4	0	0%

6.5.8 Given the high availability of berth space and the relatively low 'demand' for this space, it can be concluded that the ABP common user berths in the South Dock have spare capacity most of the time to accommodate the majority of vessels which may potentially be restricted by the proposed Scheme.

6.6 Berth Reallocation

6.6.1 To further assess the ability of the common user berths in the South Dock to accommodate vessel traffic intended for the North Dock, a further assessment was made. This involved a hypothetical scenario, where vessels with a deadweight of 5,000 tonnes or more visiting the North Dock during the period 2005 to 2015, were reallocated to the South Dock, this enabled me to assess whether the ABP common user berths in the South Dock would have been able accommodate all of these vessels.

6.6.2 The assumption that 144 m of berth space is required to accommodate one vessel typical of the North Dock has again been adopted for this assessment and again, on a precautionary basis, this represents the longest length of vessel to have entered the North Dock during the data collation period.

6.6.3 The following table shows the percentage of time during the 11 year period, when all the vessels relocated from the North Dock could be berthed at the South Dock common user berths.

Table 6-8 Percentage of time during study period when full reallocation is possible

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Totals
No. of days reallocation is needed	7	10	36	5	12	5	0	12	6	4	24	121
No. of days reallocation is possible	6	10	36	5	12	5	0	12	6	4	20	116
Percentage	86%	100%	100%	100%	100%	100%	100%	100%	100%	100%	83%	96%

6.6.4 This assessment shows that for a high proportion of the time, the South Dock can accommodate the vessels initially allocated to the ABP common user berths in the North Dock.

6.6.5 However, the analysis has also highlighted that in 2005 and 2015 a situation where all the vessels using North Dock would have been displaced and there was insufficient berth space in the South Dock to accommodate these vessels.

6.6.6 In 2005, there were seven days during which vessels from the North dock would need to be berthed in the South Dock. During one day, relocation of a vessel from the North Dock would not be possible. Further investigation of the data showed that only one vessel was affected and the delay lasted only one day, in percentage terms during 2005, 99% of vessel operations would have been unaffected by the Scheme.

6.6.7 In 2015, there were some 24 days when North Dock vessels would be required to berth in the South Dock. During four days, relocation to the South Dock was not possible. Further investigation of the data showed that two vessels would have been delayed by two days each.

6.6.8 In reality, such vessels would be informed of any delays prior to arrival, allowing them to time their arrival at the Port when berths were free. Alternatively, it is normal for vessels to anchor until a berth becomes available.

7. RIVER USK

7.1.1 The vessel traffic data as provided by ABP was used to analyse the traffic movements on the River Usk. The data has not been verified, as the air draft clearance on the River Usk is not an issue.

7.1.2 Throughout the data period (Dec 2004 to Dec 2015) it was found that only one vessel included within the ABP data set would have been impeded by the 32.04 m height restriction, allowing for the 1.5 m safety clearance that would be imposed by the bridge where it crosses the River Usk.

7.1.3 This vessel that was included in the dataset which would be restricted by the proposed Scheme was the 'Goldmar' IMO no. 8402955 and was bound for Lysaght's wharf on 1st November 2006 with a recorded air draft 31.0 m. The recording of this vessel within the ABP data appears to be a mistake, I have been in touch with the then operators of Lysaght's Wharf and their records show that a vessel called Douwent IMO no. 8703139 was berthed at Lysaght's on the 1st November 2006 discharging a cargo of steel coils. In any event, the Goldmar is too big to get to Lysaght's wharf with a 39,697 tonnes deadweight, 190 m, and 29.6 m beam.

7.1.4 The vessel with the next highest recorded air draft in the river Usk was the 'Koroli' IMO no. 9180841 which was recorded to have visited Lysaght's Wharf on 17th September 2005 with an air draft of 27.6 m. This vessel could pass comfortably beneath the bridge over the River Usk.

7.1.5 In any event the only operational berth remaining upstream of the proposed River Usk crossing is Dallimore's wharf, this berth is accessed by dredgers such as the Arco Dart which has an air draft of 22.4 m.

7.1.6 I therefore conclude from the historical data that all ships that have visited Lysaght's wharf would still be able to access the wharf with the proposed River Usk crossing in place.

Figure 7-1 MV Douwent alongside Lysaght's Wharf on the River Usk

8. RESPONSE TO OBJECTORS

8.1 Associated British Ports (ABP)

8.1.1 ABP have made two separate objections to the proposed Scheme. In a letter dated 29th April 2016, Winckworth Sherwood acting on behalf of ABP, issued a formal objection to the draft Orders and in a letter dated 29th April 2016, ABP made a representation to the Secretary of State for Transport under section 16 of the Acquisition of Land Act 1981 objecting to the proposed Scheme.

8.1.2 ABP's representation to the Secretary of State for Transport included the following points:

a) 'The Port is a facility that […] forms a significant component within the transport and economic infrastructure of Wales […] which has either been ignored or fundamentally misunderstood by Welsh Government'.
b) 'the proposed M4 Relief Road scheme will […] have a critically serious and detrimental impact upon the Port in terms of current and future operational viability'.

8.1.3 My response covers the impact of the Scheme on ABP's marine operations. The potential economic implications as a result of the propose Scheme are addressed by Andrew Meaney Port Economics (WG 1.4.1).

8.1.4 Analysis of ship movement data provided by ABP covering the period 2005 to 2015 showed that 24% of the vessels visiting the North Dock during the period would have been impeded by the air draft restriction introduced by the Scheme.

8.1.5 Taking into consideration the possibility of chartering alternative vessels with lower air drafts, it was concluded that for vessels up to 5,000 tonnes deadweight, the chartering of alternative vessels with lower air drafts, is feasible.

8.1.6 For vessels exceeding this threshold, while alternatives exist, they are rare and therefore chartering alternative vessels with low air draft is more of a

challenge. I have conservatively assumed that vessels exceeding a deadweight of 5,000 tonnes would be restricted from entering the North Dock because of the proposed bridge height and will therefore need to be relocated to the South Dock. Investigation of the vessel movement data showed that impeded vessel visits amount to approximately 5.6% of all the visits to the North Dock during the data collation period.

8.1.7 A berth occupancy study was conducted to assess whether the South Dock would have the spare capacity to accommodate the vessels potentially relocated from the North Dock. This study suggests that only 3% (as per Table 6-7) of the time, a vessel would need to be relocated and that 96% (as per Table 6-6) of the time, spare capacity is available in the South Dock to accommodate the vessel.

8.1.8 I conclude that, from a marine operations perspective, the ABP Newport Docks will, in the vast majority of cases, be able to continue to operate unaffected by the proposed Scheme.

8.2 Newport Harbour Commissioners (NHC)

8.2.1 In a letter dated the 22nd April 2016 the Newport Harbour Commissioners (NHC) also made a formal objection to the proposed Scheme. Their objection was based on their belief 'that the constructing of a motorway across a major Welsh infrastructure asset would have a deleterious effect on the local economy. For instance, the costs of administering this organisation, which is none profit making, would have to be covered by the remaining stakeholders'.

8.2.2 They claim that in order to continue as an organisation the harbour dues charged to vessels visiting the Port would need to be increased and conclude their objection with the statement 'Generally, the proposed restrictions on foreign trade will not assist Newport to thrive'.

8.2.3 Within the River Usk, analysis of the ship movement data showed the present navigation envelope will leave no vessels impeded. We can therefore conclude that the berths and wharfs on the river Usk will be unaffected by the proposed bridge over the River Usk.

8.2.4 As discussed in Section 8.1, the impact of the Scheme on the ability of the Newport Dock to accommodate the visiting vessels would be very limited.

8.2.5 It is my view that given the limited impact on the Newport Docks, NHC's activities will not be affected. In his Proof of Evidence, Mr Andrew Meaney Port Economics (WG 1.4.1) addresses the commercial aspect of NHC's objection.

8.3 Jewsons Limited and Saint-Gobain Building Distribution Limited

8.3.1 In a letter dated 4th May 2016, Gerald Eve acting on behalf of Jewson Ltd. and Saint-Gobain Building Distribution Ltd, made a formal objection to the proposed Scheme, citing amongst other things not connected with shipping and the proposed Scheme the following:

'[…] and the subsequent construction of the proposed motorway further to the road orders, will also prevent or significantly impede access to the Newport Docks by ships. Without the ability to continue to import timber by ship the Newport facility of Jewson and Saint-Gobain would be unable to operate'.

8.3.2 The ship movement data previously used to establish the restriction on shipping and to carry out the berth occupancy analysis was again adopted to study the impact of the Scheme on the marine operations of Jewsons and Saint Gobain.

8.3.3 Jewson Saint Gobain uses Sections 23 - 26 on the western side of the North Dock for the unloading of timber. It is to be noted that the above berths are ABP's common user berths. I understand that Jewsons and Saint Gobain do not lease any berths within the Newport Docks.

8.3.4 As previously mentioned, for vessels up to 5,000 tonnes deadweight, it is possible to charter alternative vessels with a lower air draft and therefore capable of passing safely under the proposed bridge. Vessels exceeding a deadweight of 5,000 tonnes would be impeded by the Scheme and would need to be accommodated within the South Dock.

8.3.5 The visits to Section 23-26 during the eleven-year period (2005 to 2015) was analysed to establish the number of impeded vessels. Vessels over 5,000 tonnes are assumed to be impeded. This is shown in Table 8-1.

Table 8-1 Visits to Section 23-26

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
No of visits	29	25	26	21	25	20	24	23	34	35	35	297
No of visits >5000tonne DWT	0	1	0	0	1	0	0	1	1	0	6	10
Percentage impeded	0%	4%	0%	0%	4%	0%	0%	4%	3%	0%	17%	3%

8.3.6 During the eleven-year period, 97% of the visits were made by vessel below 5,000 tonnes. This shows that the typical size of vessel calling at Jewson is usually below the 5,000 tonnes deadweight.

8.3.7 For the remaining 3% of vessels, the analysis on berth occupancy has shown that spare capacity exists most of the time in the South Dock to accommodate any vessel redirected from the North Dock as a result of the proposed Scheme.

8.3.8 For the reasons stated above, I do not anticipate that the marine operations of Jewsons and Saint-Gobain within Newport Docks would be severely impeded by the Scheme.

8.3.9 Please refer to Mr Andrew Meaney's evidence Port Economics (WG 1.4.1) for the potential economic aspects of this objection.

8.4 WE Dowds Shipping Ltd

8.4.1 In a letter dated 26th April 2016 Graham Dickinson acting on the behalf of WE Dowds Shipping Ltd. made a formal objection to the proposed Scheme, citing amongst other things not connected with the shipping aspects of this Proof of Evidence the following:

'The proposed bridge height above the entrance to North Dock is inadequate to accommodate the larger vessels currently serviced by the Company in that part of the dock. As shipping traffic has built up, leading to congestion in South Dock, it is understood that ABP are actively considering enlarging the entrance to allow even larger vessels to use North Dock. The latter otherwise has the necessary quay lengths and water depth to handle much larger ships.

The height restriction imposed by the current road design will curtail some existing business and forestall the prospect of such enlargement'.

8.4.2 The ship movement data previously used to establish the restriction on shipping in the North Dock and to carry out the berth occupancy analysis was again adopted to study the impact of the Scheme on the marine operations of WE Dowds Shipping Ltd.

8.4.3 The company uses the ABP common user berths, sections 21-22 located on the eastern side of the North Dock. It is my understanding that the company does not lease any quay space within Newport Docks.

8.4.4 As previously mentioned, for vessels up to 5,000 tonnes deadweight, it is possible to charter alternative vessels with a lower air draft and therefore capable of passing safely under the proposed bridge. Vessels exceeding a deadweight of 5,000 tonnes would be impeded by the Scheme and would be need to be accommodated in the South Dock.

8.4.5 The visits to Sections 21-22 during the eleven-year period (2005 to 2015) were analysed in order to establish the number of potentially impeded vessels. Vessels over 5,000 tonnes are assumed to be impeded by the proposed Scheme. This is shown in Table 8-2.

Table 8-2 Visits to Section 21-22

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
No of visits	35	57	49	32	24	19	19	2	0	6	21	264
No of visits >5000tonne DWT	2	2	8	1	2	2	0	1	0	1	2	21
Percentage impeded	6%	4%	16%	3%	8%	11%	0%	50%	0%	17%	10%	8%

8.4.6 During the eleven-year period, 92% of the visits were made by vessels below 5,000 tonnes in deadweight. This shows that the typical size of vessels calling at this particular berth was usually less than 5,000 tonnes.

8.4.7 For the remaining 8% of vessels, the analysis on berth occupancy has shown that spare berth capacity exists in the South Dock which is capable of accommodating vessels potentially restricted from entering the North Dock as result of the Scheme. In support of my assessment into relocating potentially impeded vessels from the North dock to the South Dock, it is my

understanding that the company currently undertake stevedoring and storage operations in both the South and North Docks.

8.4.8 Considering the above, I am of the view that the impact on the marine operations at Newport Docks as a result of the proposed Scheme will have minimal impact on the shipping activities of WE Dowds Shipping Ltd.

8.4.9 Mr Andrew Meaney addresses the onshore aspects of this objection in his Proof of Evidence Port Economics (WG 1.4.1).

8.5 TU Agencies Ltd

8.5.1 In a letter dated 14th April 2016, TU Agencies Ltd. made a formal objection to the proposed Scheme on the basis of:

'The proposed route of the M4 passes over Newport Docks on a line which separates the North Dock from the South Dock. This will mean that the North Dock will no longer be accessible for many vessels now using the facilities of the North Dock.'

8.5.2 The impact of the Scheme on the North Dock has been thoroughly examined using vessel movement data provided by ABP, and it has been concluded that, the marine operations at Newport Docks are unlikely to be severely affected. It is therefore unlikely that the business of TU Agencies Ltd will be severely affected.

9. CONCLUSION

9.1 Newport Docks

9.1.1 My Proof of Evidence demonstrates that should the proposed Scheme go ahead, assuming that dock levels are raised to account for climate change, the bridge spanning the Newport docks would be constructed to allow for a vertical clearance of 26.20 m over the Junction Cut. With a vertical clearance of 26.20 m and a recommended reasonable safety margin of 1.0 m, vessels wishing to visit the North Dock would be restricted to a maximum air draft of 25.20 m.

9.1.2 This takes into account the effects of climate change and possible sea level rises. In order to counter these effects, ABP propose to renew the South Lock outer gates to a level of 14.21m (ACD). If the middle and inner gates are also replaced and repair work to the coping stones in the region of the Junction Cut is carried out, then it will be possible to raise the dock water level to 14.21m (ACD). ABP have not yet evidenced their intention to carry the above works.

9.1.3 However, on a precautionary basis, to cater for the worst case scenario in terms of air draft clearance should the Scheme go ahead, the raised dock water level was used to establish the navigation envelope of 25.2m. If the dock water level is not raised then the maximum allowable air draft would be 25.86m.

9.1.4 My analysis of the historical vessel movement data, using the verified air draft data, shows that based on a maximum air draft of 25.86 m, 99 vessel visits out of a total of 568 would have been impeded by the Scheme, this equates to 17%. Based on a maximum air draft of 25.2m for a raised dock level, 138 vessel visits out of a total of 568 visits would have been impeded by the Scheme, this equates to 24%.

9.1.5 My analysis shows that, with the Scheme in place, it is unlikely that vessels of more than 5,000 tonnes in deadweight would be able to access the North Dock.

9.1.6 For vessels with a deadweight less than 5,000 tonnes, the analysis has shown that alternative vessels with air drafts of 25.2m or less are available and have visited the dock in the past. For vessels more than 5,000 tonnes deadweight, the same conclusion could not be made. This is a conservative conclusion as the data shows that vessels of 5,000 tonnes and above have previously entered the North Dock and would be unimpeded by the air draft restriction.

9.1.7 The ability of the North Dock to handle vessels up to 5,000 tonnes deadweight is in my view unaffected by the Scheme. Larger vessels would need to be accommodated in the South Dock. Analysis of the vessel visits during the eleven year data collation period showed that only 5.6% of the visits to the North Dock were made by vessels of 5,000 tonnes or more in deadweight.

9.1.8 I have conducted an assessment to determine whether there is spare berth capacity in the South Dock to accommodate vessels that are potentially unable to access the North Dock.

9.1.9 My first approach was to quantify the utilisation of the relevant the common user berths within the Newport Docks. This showed that the berths in the South Dock generally have a higher rate of occupancy than those in the North Dock. The data analysis, however, suggests that there is spare berth capacity within the South Dock.

9.1.10 The second approach involved quantifying the availability of berth space in the South Dock and quantifying the potential ‘demand’ from vessels exceeding 5,000 tonnes deadweight. This assessment showed that there is high level of berth availability in the South Dock compared to a relatively low ‘demand’ for this space.

9.1.11 I anticipate that 3% of the time, a vessel may need to be relocated from the North Dock to the South Dock, and that 96% of the time, spare capacity exists within the South Dock to accommodate the vessel. Based on the historical vessel visits to the Docks, the probability of not being able to accommodate a vessel within the South Dock is therefore very low.

9.1.12 In order to assess whether there was adequate spare berth space, the third approach involved testing a hypothetical scenario in which vessels over 5,000 tonnes visiting the North Dock during the eleven-year period were relocated to berths within the South Dock. This approach showed the South Dock would have been able to accommodate the vessels in the majority of cases.

9.1.13 I have also considered the impact of the Scheme on the two main tenants in the North Dock, W E Dowds Shipping Ltd and International Timber. The percentage of vessels above 5,000 tonnes deadweight calling at International Timber in the North Dock was found to be low (3%). For vessels, below 5,000 tonnes, alternative vessels with low air draft can be chartered. In the case of WE Dowds Shipping Ltd, the percentage was slightly higher (8%). However, as previously shown, relocation of vessels to the South Dock is feasible. Moreover, WE Dowds Shipping Ltd operates in both the North and the South Docks.

9.2 River Usk

9.2.1 The proposed bridge over the River Usk is designed to be at a height of 40.03m AOD, based on a design water level of 6.49m AOD, including a reasonable air draft safety clearance of 1.5m, the maximum air draft of a vessel passing under the bridge would be 32.04m.

9.2.2 The only vessel included in the ABP historical dataset which would be restricted by the proposed Scheme over the river Usk was the 'Goldmar' IMO no. 8402955. The vessel was reported to be berthed for Lysaght's Wharf on 1st November 2006 with a recorded air draft 31.0 m. Further enquiries made to the berth operator revealed that the vessel had been recorded in error as ever having visited Lysaght's Wharf. In fact at this time a vessel called the 'Douwant' was on the berth discharging a cargo steel coils.

9.2.1 The next highest air draft recorded for vessels visiting the river Usk was provided by the vessel 'Koroli' IMO no. 9180841 which was recorded to have visited Lysaghts Wharf on 17th September 2005 with an air draft of 27.6 m. This vessel would pass comfortably beneath the proposed bridge over the

River Usk. In any event, with the exception of Dallimore's wharf, there are no longer any working wharves upstream of the proposed river Usk crossing.

9.2.2 We can therefore conclude that the berths and wharfs on the river Usk will be unaffected by the proposed bridge over the River Usk.

9.3 Statement of Truth

9.3.1 My Proof of Evidence includes all facts which I regard as being relevant to the opinions which I have expressed and the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

9.3.2 I believe the facts I have stated I this Proof of Evidence are true and that the opinions expressed are correct.

9.3.3 I understand my duty to the inquiry to assist it with matters within my expertise and I believe that I have complied with that duty.