

Associated British Ports

Port of Newport – M4 Proposal: Impact on the Port's Mobile Harbour Cranes

Introduction and Context

- 1.1 The Port of Newport owns three Mobile Harbour Cranes (MHC). These are highly versatile pieces of equipment that are critical to the Port's operation. They can be deployed in virtually any part of the Port and can be moved easily and quickly around the dock in response to the requirements of ship loading/unloading operations, as well as to supplement the Port's conventional rail-mounted quayside cranes, which are limited to parts of South Dock and do not offer the same level of capacity, functionality and flexibility. The MHCs can also be quickly adapted to deal with different cargo types, by using hook, grab (and potentially in the future, container) attachments. In short, they are a highly efficient and flexible solution to the cranning needs of the Port.
- 1.2 The introduction of MHCs at Newport has led to a dramatic improvement in the operational efficiency of the Port. Prior to delivery of the first MHC in 1995, the Port operated 24 quayside cranes and handled 1.32m tonnes of cargo. Today, with 11 fewer cranes, the Port is handling significantly higher cargo volumes – for example 1.85m tonnes in 2014. The reduction in crane numbers has also unlocked equally as significant cost savings enabling the Port to remain competitive – for example in 1995 the Port employed 43 mechanical and electrical personnel – the equivalent figure today is 11 and a proportion of this reduction reflects the reduced crane maintenance requirements. Similarly the number of crane drivers has also been reduced as one MHC is able to outperform several of the older quayside cranes.
- 1.3 ABP has, at the request of Welsh Government (WG), approached the manufacturer of the Port's MHCs, Liebherr, in order to obtain its assistance in determining the impact of WG's proposed M4 relief road on the operation of the MHCs, given that the road, if approved, will introduce a height restriction crossing the entirety of the Port. Other manufacturers produce similar cranes, although as far as we are aware, the same operational issues will arise as a result of the M4 proposal.

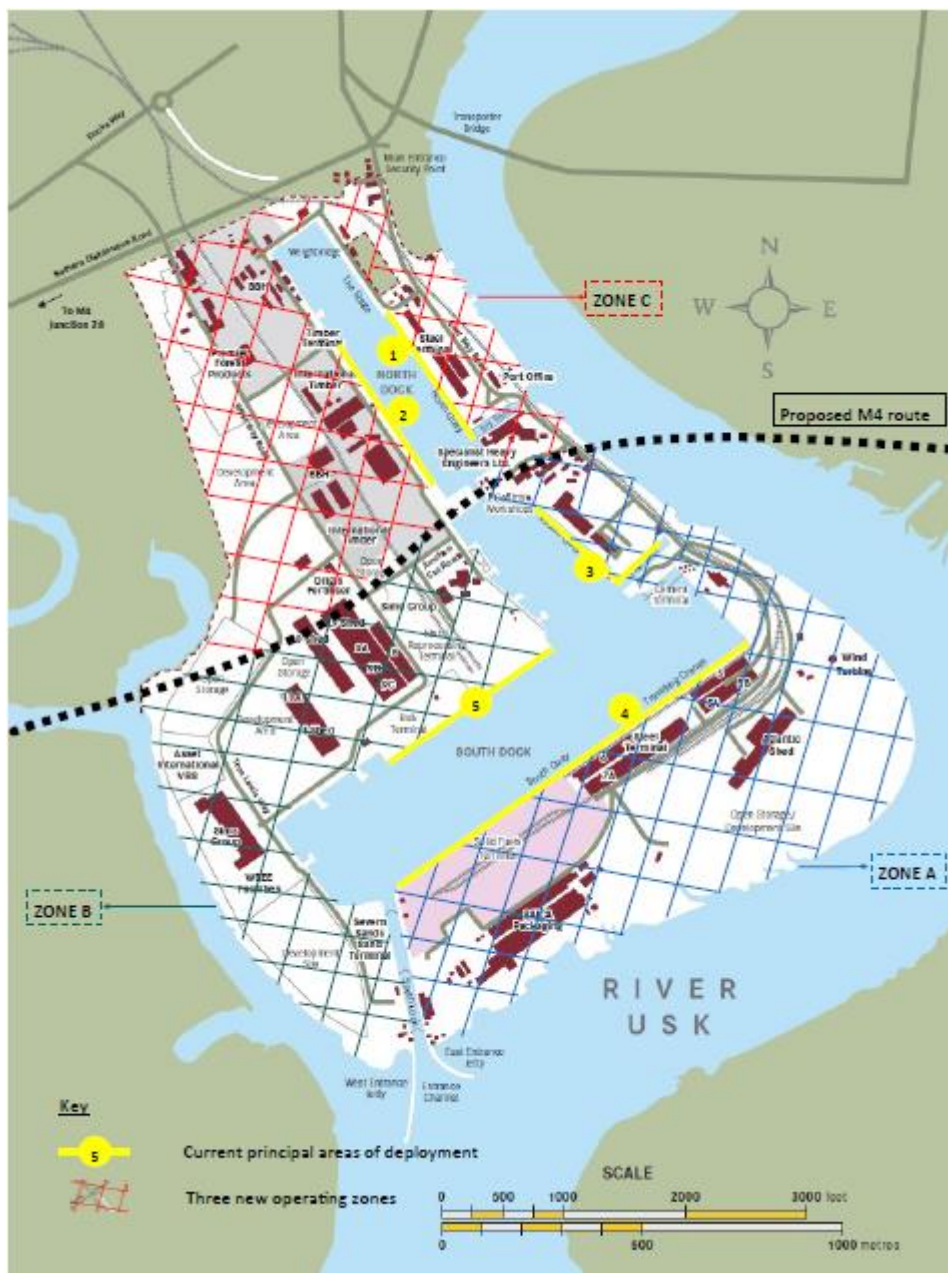
The Port's MHCs

- 1.4 The fleet of MHCs currently comprises:
 - Two (no) LHM180 – dating from 2011 and 2015
 - One (no) LHM1120 – dating from 1992
- 1.5 ABP anticipates commencing the process for replacement of the LHM1120 in 2017 for delivery during 2018 and have budgeted accordingly for this, subject to having an acceptable degree of clarity on the M4 proposals.

1.6 The MHCs are regularly used at a variety of locations throughout the Dock, with the principal areas of deployment being:

- The eastern side of North Dock – marked '1' below
- The western side of North Dock – marked '2'
- Middle Quay and East Lock – marked '3'
- The south side of South Dock – marked '4'
- The north side of South Dock – marked '5'

All three MHCs can be used in all these areas of the Port, with up to three operating in any combination, in any of the 5 main areas identified above. In a typical year, there are around 70 crane movements that would be impacted by the proposed M4.



1.7 The principal areas noted above form 5 distinct operational areas of the Port and it is essential that each of those 5 principal areas is appropriately served with cranes. This

underlines the flexibility that the fleet of MHCs brings to the Port which, in turn, has helped the Port remain competitive against competing facilities.

- 1.8 The MHCs must follow predetermined routes around the Port, using roads that have been specially strengthened and which are of sufficient width to accept the width of the crane in travel mode (approximately 5.3m with the pads removed).

Impact of the M4 proposal on the Port's cranes

- 1.9 In order to travel around the Port, the MHCs must be placed into travel mode – this entails raising the crane's boom into an almost upright position to reduce to a minimum the possibility of the crane become unstable whilst moving. In travel mode, the crane's height is 48.8m.
- 1.10 In general terms, the proposed M4 bridge effectively splits the Port into three distinct zones – being:
- The south of South Dock and the eastern part of Middle Quay, to the south of the M4 (zone A, denoted by the light blue cross-hatching in the drawing above)
 - The north of South Dock (zone B – dark blue cross hatching)
 - The entirety of North Dock (zone C – red cross hatching)
- 1.11 The route that the MHCs must follow to move around the dock, therefore, crosses under the proposed M4 at three primary locations – being East Way Road, West Way Road and Junction Cut Road (to the west of Junction Cut in the vicinity of the International Timber operation). ABP understands that the proposed height of the M4 at these points is 26.98m, 20.09m and 12.13m respectively. The attached Liebherr report also refers to a fourth potential crossing route immediately adjacent to the east of Junction Cut, which passes very close to a working berth and the Engineering workshops, but it is as equally constrained as the East Way Road option and is not currently an approved MHC travel route.
- 1.12 It follows clearly that the Port's two LHM180s will be unable to pass under the proposed M4. Further, whilst the Port's 1120 MHC will theoretically be able to pass under the proposed M4, it will require significant preparation work to do so, which effectively prevents the regular movement of this crane under the proposed M4 and is likely, in any event, to have been replaced by the time the M4, if approved, has been constructed.
- 1.13 The attached Liebherr report indicates that it is possible to modify the two LHM180 MHCs to fit under the M4 bridge to the east of Junction Cut. It will, however, take up to around three to four hours to move the crane (depending on whether in hook or grab mode) under the M4 due to the need to stop the crane, lighten it (by removing weight from the end of the boom to reduce instability), refit the crane stability pads, lower the jib, move it at slow speed under the M4 and then raise the jib, remove the crane pads and reinstate the equipment previously removed to lighten the crane.
- 1.14 Two further factors are relevant here:

- It is unlikely that sufficient space exists immediately either side of the M4 at this location to the East of Junction Cut, to create the areas required to manoeuvre the ancillary equipment (fork lifts etc.) to remove / reattach those parts of the crane to lighten it.
- The road where the proposed movement operation under the M4 needs to take place is a busy port road for which 24/7 access is required and, indeed, is the access route to Zone A. A complete road closure will be required at this location when the crane is being readied to move under the M4 and during the actual manoeuvre under the M4. Such a closure will cause significant impacts to port operations, customers and emergency access and is therefore not practical. Whilst it may be theoretically possible to develop an alternative general traffic route as part of the bridge development, any such route will have to transit operational areas of the Port (creating a fundamental safety incompatibility between port operations and general traffic using the same area), and will have a number of tight bends (which may cause swept-path issues for large vehicles).

- 1.15 In addition, Liebherr has indicated the need to impose an overall wind speed restriction preventing the movement of the cranes in wind speeds gusting in excess of 14m/s. This, of itself, adds to the uncertainty of being able to move cranes around the Port to meet ABP's operational requirements. It is not safe to permit crane travel when gusty windy conditions are forecast – to do otherwise could cause significant damage to the crane and is unsafe for the operators. ABP tends to plan crane movements one day in advance of requirements and they are often immediately moved between zones on completion of a vessel in order to be ready to start the next vessel the following morning. Cranes are however also moved at very short notice in the event of a breakdown, or to provide additional support if an operation is – for whatever reason – not taking place as efficiently as planned. The likely implication of the additional crane travel restrictions imposed by the M4 is that vessel crane requirements (planned or unplanned) will not be met, leading to significant cost increase, customer relationship issues and long-term reputational damage.
- 1.16 The attached report from Liebherr also indicates that it will not be possible for the two LHM180 MHCs to pass under the M4 to the west of Junction Cut under any circumstances.
- 1.17 In summary, therefore, the Port's two most recent LHM180 cranes will, theoretically at best, only be able to access two of the three port zones (being zones A and C) and then only after modification to the crane and port infrastructure. For each manoeuvre under the proposed M4 there will also be significant impacts on the wider operation of the Port and customer/emergency access due to road closures and restrictions imposed on crane movements due to wind conditions will no longer allow the flexible deployment of the cranes as is required to meet shipping and our customers' requirements. The movement operation is also likely to put the cranes at greater risk of damage due to the nature of the crane lowering and moving procedure. Furthermore, a crane located in zones A and C will never be able to access zone B (and vice versa). In reality, however, given the extent of the process required for each manoeuvre under the M4 each of the three zones created by the imposition of the motorway at such an artificially low height will become isolated in terms of crane provision. The cranes will effectively become marooned in their given zones.

- 1.18 This is clearly of considerable concern to ABP – for the simple reason that an inability to service the basic needs of the Port’s customers (in terms of ship discharge and loading) will impede ABP’s ability properly and efficiently to service its existing customers and will have the effect of driving business away from the Port. This, in turn, will place a very considerable question mark over the ability of the Port to develop as envisaged within the recently published Port Master Plan.

Possible Solutions

- 1.19 The most obvious solution to prevent any crange issues arising in the first place is to route the M4 motorway bridge away from the Port, such that the Port is not split into three distinct zones.
- 1.20 Raising the height, but maintaining the proposed alignment, of the M4 across the Port (to 50m+, subject to appropriate safety margins) is an alternative, but sub-optimal, solution in that it is possible that cranes in the future may continue to grow in size in response to greater cargo loads, thereby creating a possible problem in the future.
- 1.21 It would be possible to equip all the three zones, created by the current proposed M4 route, with their own cranes, such that each zone has a full complement of cranes, able to deal with the crane demands placed upon that particular zone. To give the same amount of flexibility as exists today, that would entail the need for a further six MHCs.
- 1.22 This, in turn, would lead to a worrying need to proliferate spares, consumables, routine maintenance activities, maintenance facilities, maintenance personnel, end-of-life replacement issues, all of which would require careful consideration and costing if this solution were to be pursued. In addition, it will probably be necessary to deliver some additional cranes to the Port in a dismantled state (it is the manufacturer’s preference to deliver new cranes by vessel fully assembled), in order to gain access to North Dock under the proposed M4, with a consequential need to identify (and possibly prepare) a compound for final assembly of the affected cranes (and any subsequent end-of-life replacements).
- 1.23 ABP is not aware of any equipment on the market that will provide the overall flexibility, versatility and cost effectiveness of the Port’s MHCs (which, of course, also explains their extensive use elsewhere at other UK and continental ports). For the avoidance of doubt, normal construction-type road-going cranes will not be suitable for ship discharge/loading due to their low cycle times for carrying out repeated ‘lift, swing and lower’ cargo handling manoeuvres as well as their relatively low service life as measured by a crane’s FEM classification. FEM classifications range from A1 to A8 with the higher the number, the more robust the crane. The Liebherr MHCs used at Newport are in the A8 class and therefore have the longest service life and the highest fatigue endurance.

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Attached: Liebherr report – M4 Corridor around Newport – Crane Operations within Newport Docks in Relation to the Proposed M4 Extension