3FMProject

Bringing
Dublin Port
To 2040

Environmental Impact Assessment Report

Appendix 2.2

Volume 3 Part 1

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DUBLIN PORT COMPANY

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Third & Final
Masterplan
Project
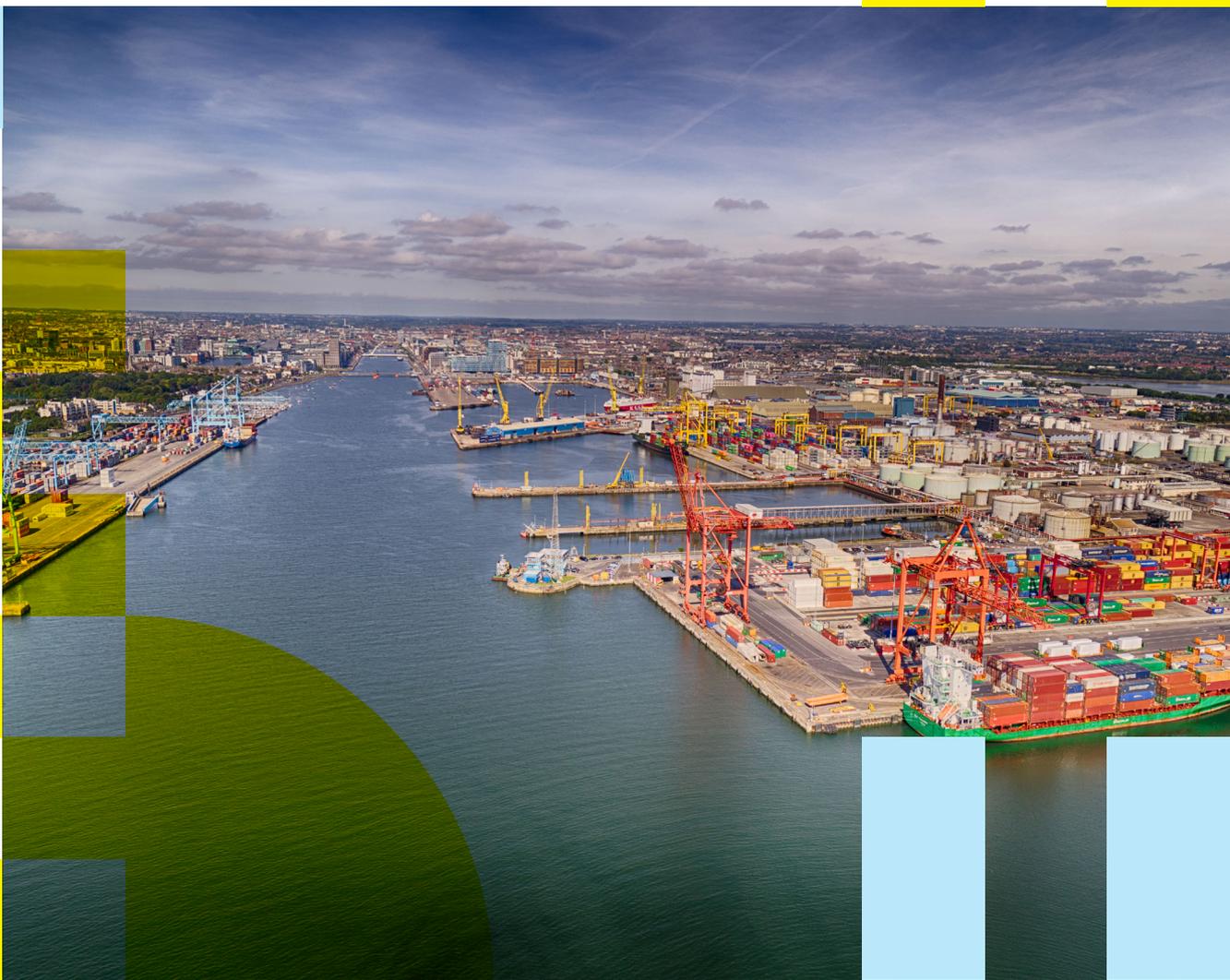
Analysis of Relationships between Projected Volumes and Capacity at Dublin Port

Submitted to

Dublin Port Company

Prepared by

Indecon Economic Consultants

Indecon

www.indecon.ie

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**Strictly Confidential**

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1 Executive Summary

1.1 Introduction

This note outlines the main features and results of a demand-capacity modelling exercise undertaken by Indecon on behalf of Dublin Port Company. The overall purpose of this modelling is to inform long-term strategic planning and ensure that Dublin Port remains agile in responding to the trading needs of the Irish economy. The demand-capacity model considers likely future levels of demand at the port and how this aligns with current and future planned capacity developments. The model is then applied to examine the various impacts of a number of possible policy decisions.

1.2 Summary of Key Findings

Although there are inevitable uncertainties with any economic and demand forecast, Indecon's analysis indicates that port volumes at Dublin Port are likely to continue to expand in line with projected growth in the Irish economy. The Department of Finance predicts continued strong growth in the Irish economy in the medium term. From Dublin Port's perspective, it is important to plan for a high-growth scenario so that capacity is available before demand must be met. This is because of the potentially very significant economic costs that would arise as a result of the inability of the port to meet customer demand.

Capacity at Dublin Port has been estimated based on assumptions that Dublin Port operates at a very efficient level by European port standards. This efficiency is also likely to improve with future large investments such as 3FM. The demand forecasts are overlaid on the estimated capacity at Dublin Port. The analysis indicates that Dublin Port is likely to operate at close to capacity for both RoRo and LoLo for the remainder of the current decade. Careful operational management will therefore be required to avoid potential disruptions to the trading ability of the port. The chart below highlights these findings in relation to RoRo.

Baseline RoRo Model (Capacity enhancements as per Masterplan)

Source: Indecon Demand-Capacity Model
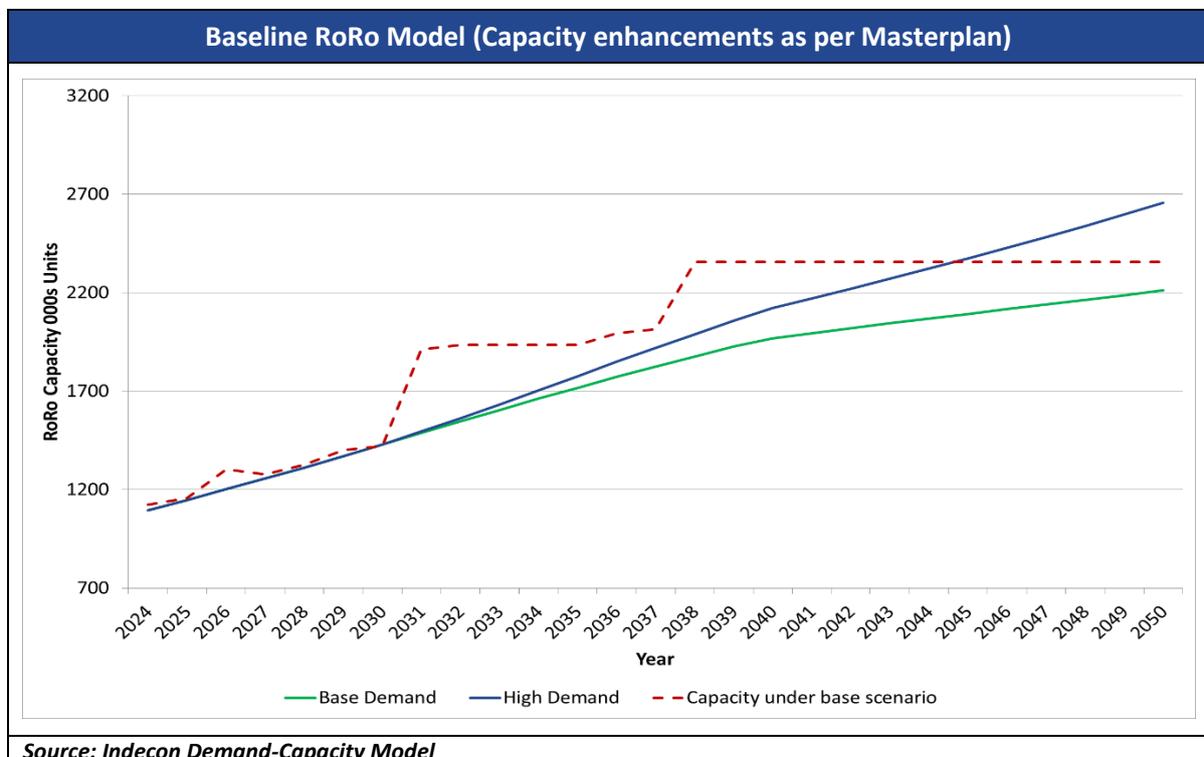
The other main mode (LoLo) faces similar challenges (see chart below). It is likely that Dublin Port will be operating at peak capacity for the rest of the decade. Subsequent capacity enhancements will ensure that there is sufficient LoLo capacity at the port until at least the mid-2040s. 3FM will then be required to significantly increase LoLo capacity at the Port by the end of the 2030s.

Baseline LoLo Model (Capacity enhancements as per Masterplan)

Source: Indecon Demand-Capacity Model
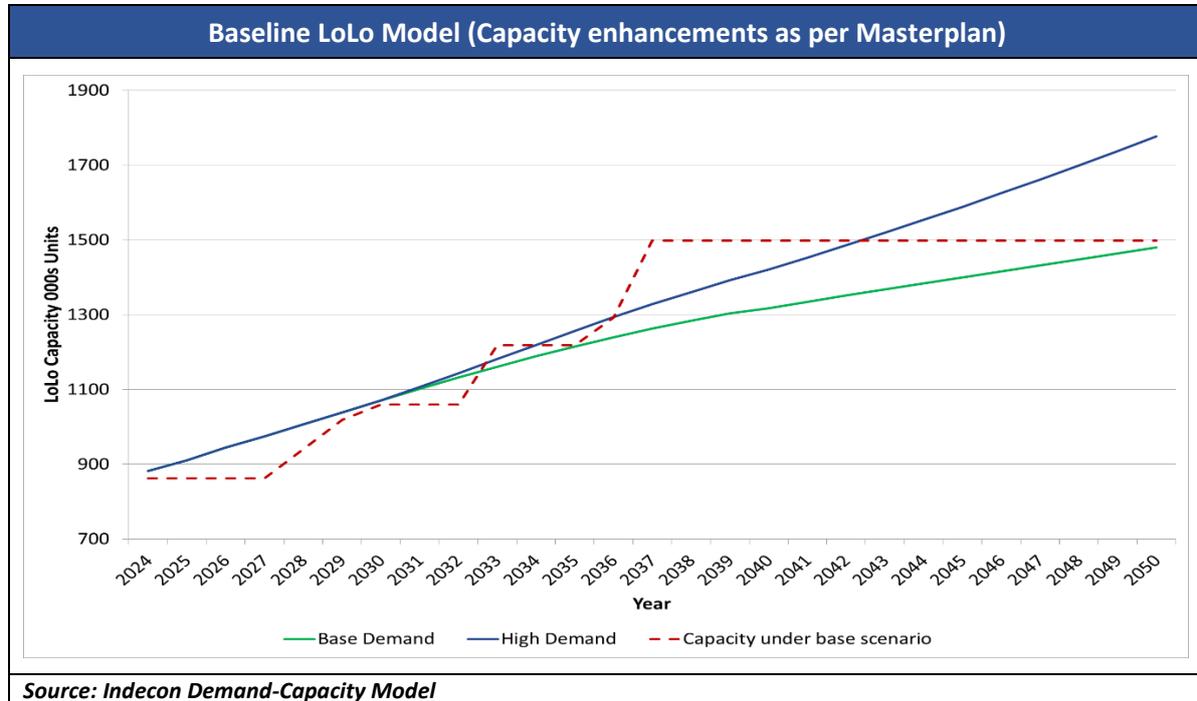
There are a number of policy decisions that may be made which would significantly limit Dublin Port's ability to meet these forecasted levels of demand. These would have negative economic impacts in terms of lost trade, or negative environmental impacts if goods may need to be diverted to other ports at a distance from Dublin Port's customer catchment area. It is also important to note that there are no current feasible plans at other ports to cater for these levels of demand that would be unmet by Dublin Port. This creates a significant risk to the Irish economy which is heavily reliant on a strong exporting sector. This exporting sector also relies on imported raw materials. The table outlines the potential value of lost trade under the possible different capacity constraints.

Estimate of the Value of Trade Lost at Dublin Port if Certain Capacity Constraints Occur (Annual Estimates based on 2022 values)		
Potential Constraint	**Capacity Implications**	**Estimated Potential Value of Lost Trade (€ billion)**
Return of the Brexit Lands (15 Ha)	251,000 RoRo Units	€5.0-5.6
6Ha Nature Reserve**	238,000 LoLo units	€1.8-2.1
Train in Alex Quay	210,000 LoLo units	€1.6-1.8
Train in Southern Port	125,000 LoLo units	€1.0-1.1
Total Gross Impact***	573,000 LoLo units & 251,000 RoRo Units	€9.4-10.6
Source: Indecon modelling		

2   Scenarios for Future Trading Demand at Dublin Port

2.1   Introduction

There are significant uncertainties in any demand forecast. Indecon has undertaken a number of different approaches to examine the historical relationship between activity in the economy and volumes of goods handled at Dublin Port. Our approach to demand forecasting relies on a triangulation of approaches, including:

– Graphical analysis

– Correlational analysis

– Econometric analysis

Each of these approaches can be considered to assess the historical relationship between economic activity and port volumes at Dublin Port. These historical relationships are important in assessing the likely future relationship. Any evidence of a possible change in the statistical relationship is also important to consider.

2.2   Analysis of Historical Trends in Port Tonnage and Economic Activity

2.2.1   Graphical analysis

It is instructive to first undertake a high-level graphical analysis of Dublin Port's annual tonnage since 1980 against a range of metrics, including Irish economy GDP, GNP, private consumption, and population.   The first figure below examines the relationships based on overall port tonnages. Key observations include:

– Growth in Dublin Port's tonnage has most closely followed economic activity as measured by GDP/GNP/GNI.

– In general, stronger associations are evident from the mid-1990s compared to the 1980s.

– On its own, Ireland's population has not been the primary driver of port activity. Of much greater importance has been the combined impact of population expansion, growth in average incomes, and consumption.

Figure 2.1: Long-Term Historical Trends in Annual Dublin Port Tonnage versus Selected Key Socio-Economic Indicators (All Metrics Re-based to Indices for Comparison, with 1980 = 100)
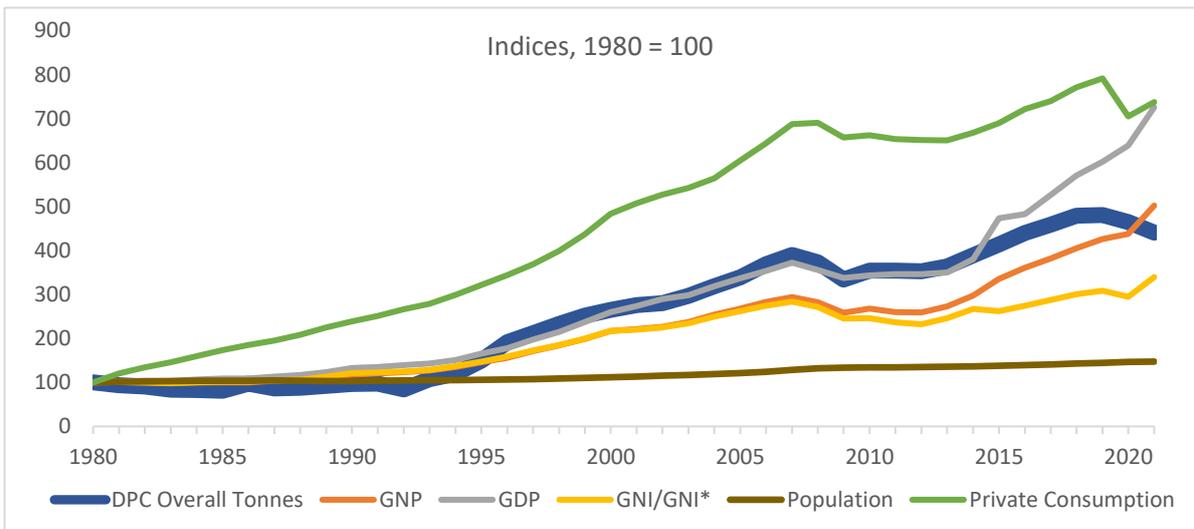
Source: DPC & CSO

Dublin Port traffic was subject to considerable year-to-year volatility up until the mid-1990s. However, from the late-1990s up to just before the COVID-19 pandemic and barring the exceptional national accounts data in 2015, very strong co-movements were evident between annual growth in port volumes and GDP/GNI.

Figure 2.2: Long-Term Historical Trends in Dublin Port Tonnage versus GDP and GNP – Annual % Changes
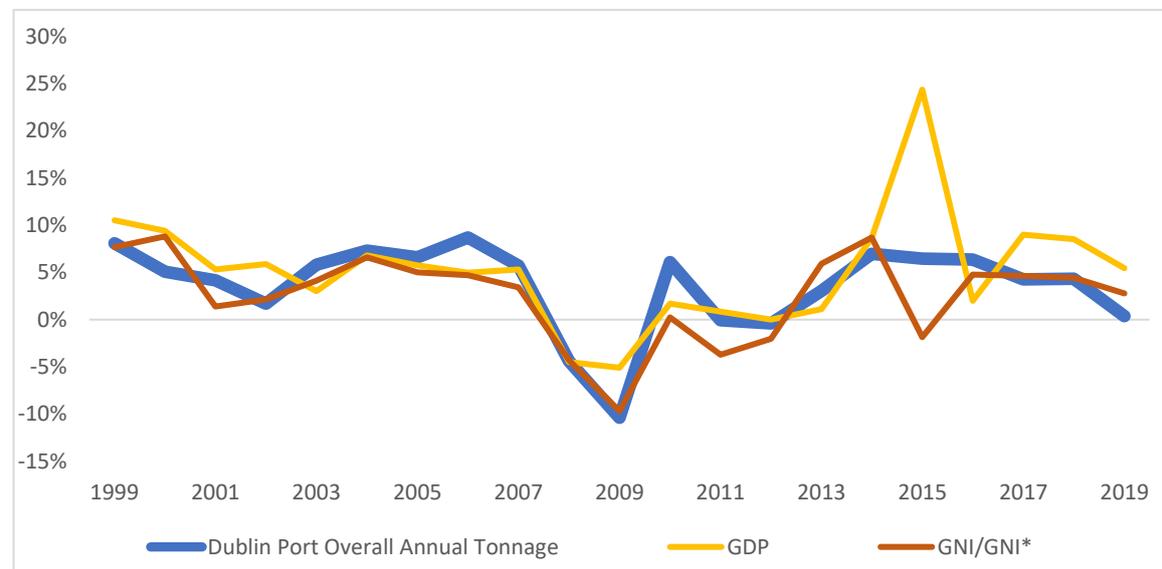
Source: DPC & CSO

Strong co-movements are also evident between annual growth in port volumes and household private consumption (see chart below).

Figure 2.3: Long-Term Historical Trends in Dublin Port <u>Import Tonnage</u> versus <u>Economy-wide Private Consumption</u> – Annual % Changes

Source: DPC & CSO
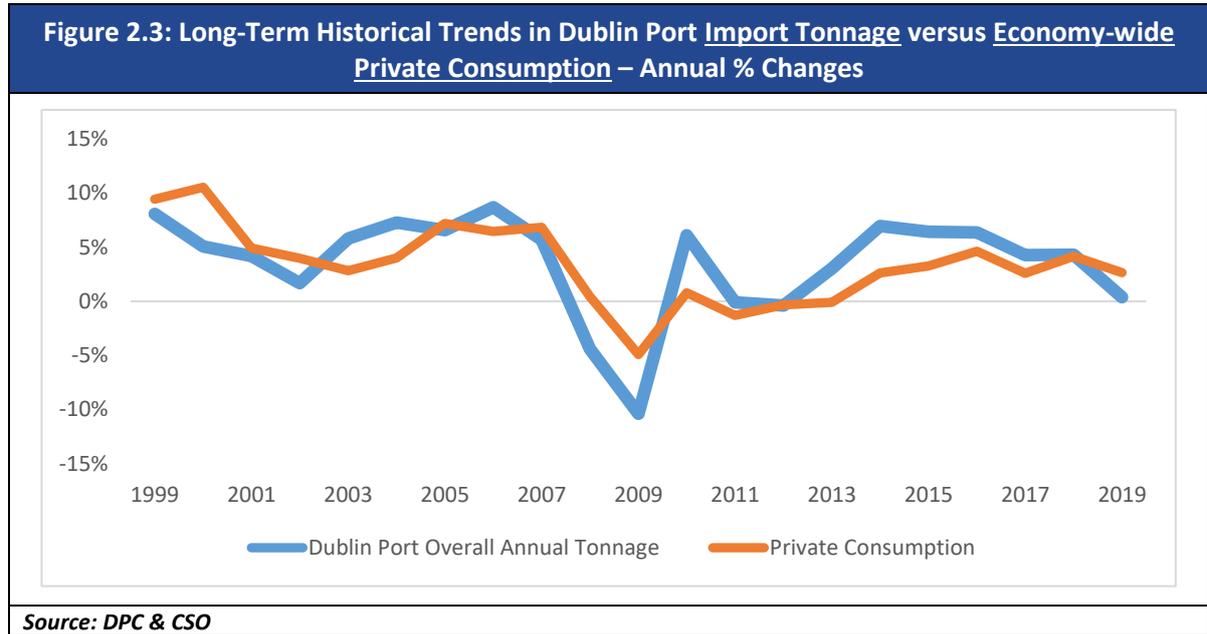
The previous analysis looks at overall tonnage volumes at Dublin Port, but it is also important to consider the composition of this tonnage and how this has evolved over time. This is shown in Figure 2.4, which highlights the significant growth in RoRo volumes since 2010. Since 2000, RoRo tonnage at Dublin Port has increased by 94%. Both LoLo and Bulk have also increased but by much smaller amounts (44% and 32%, respectively).

Figure 2.4: Long-Term Historical Trends in Dublin Port <u>– Modes of tonnage volumes</u>

Source: DPC & CSO
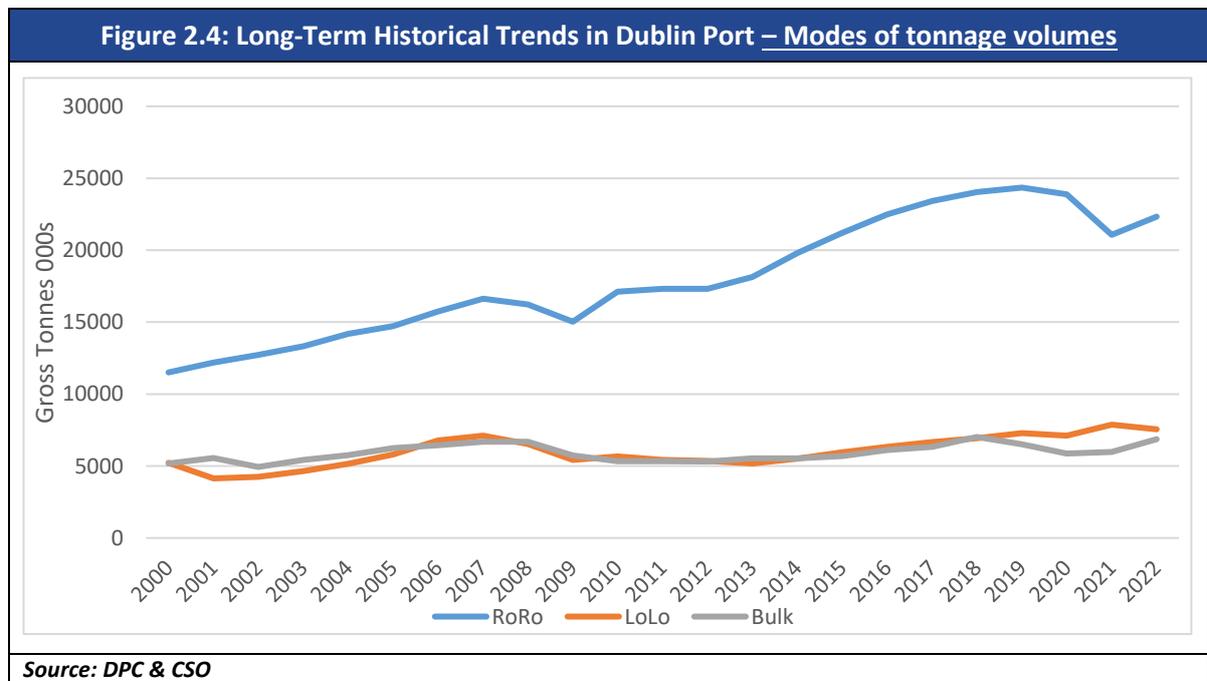
This increase in RoRo trade, in particular, has important implications for the future capacity planning at Dublin Port, given that this mode has different space and infrastructure requirements compared to LoLo and Bulk trades.

2.2.2   Correlation Analysis

Informed by the graphical analysis, Indecon has also undertaken a first-order correlation analysis between Dublin Port trade volumes and selected economic drivers. This analysis has also been completed on two bases:

> ➢ Computing correlations based on annual data over the period 1999-2019; and
> ➢ Computing correlations based on data on annual percentage changes in metrics.

It is important to caveat that correlation does not imply causation, and therefore this analysis is indicative of broad trends and co-movements.

While correlations vary depending on the period of computation and are impacted by specific events, including Brexit and the COVID-19 pandemic, overall, the analysis finds strong correlations between Dublin Port tonnage and a range of economic activity metrics, particularly GNP, GDP, and household consumption (see table below).

Table 2.1: Correlations between Dublin Port Trade Volumes and Selected Economic Drivers (Based on Annual Data over 1999-2019)				
	GNP	**GDP**	**GNI***	**Household Consumption**
Dublin Port Overall Tonnage	0.97	0.96	0.92	0.96
Source: Indecon analysis of DPC and CSO data				

Given that comparison of levels-based data may be subject to autocorrelation due to the impact of time trends, it is instructive to also examine correlations based on annual percentage changes in metrics. As shown in Table 2.2, while the correlations are lower than in the above analysis, it is still noteworthy that there has been a strong co-movement between annual growth in Dublin Port trade volumes and annual growth in GNP, GDP, GNI and household consumption.

Table 2.2: Correlations between Dublin Port Trade Volumes and Selected Economic and Demographic Metrics (Based on Annual % Changes over 1999-2019)				
	GNP	**GDP**	**GNI***	**Household Consumption**
Dublin Port Overall Tonnage	0.86	0.62	0.81	0.73
Source: Indecon analysis of DPC and CSO data				

2.2.3 Econometric Analysis

While simple correlations can provide useful indications of broad trends, they do not represent deterministic relationships between metrics. To enable a more robust assessment of the relationship between Dublin Port trade volumes and activity levels in the Irish economy, Indecon has undertaken an econometric regression analysis. This examined the long-run relationship between port volumes and GDP, as follows:

Variables

Dependent variable: LnDPTON (Natural Log (Ln) of Dublin Port Annual Tonnage)

Explanatory/independent variable: LnGDP_OECD (Natural Log (Ln) of Irish economy GDP in constant prices (based on OECD data))

Model

The basic model specification tested was as follows:

$LnDPTON = \alpha$ (constant) $+ \beta$ (LnGDP_OECD)

Data range

1990-2022

A number of different estimation procedures were tested. In particular, it was determined that the initial OLS-based estimation had significant problems with serial correlation. To correct for this spurious correlation, a Prais-Winsten AR1 procedure was applied. The final results using this process are presented in Table 2.3. The key finding from this regression analysis was that the coefficient of the GDP metric was 0.9. This indicates that a 1 percentage point change in GDP predicts a 0.9 percentage point change in annual port volumes, suggesting an almost 1:1 relationship. The total variation in port volumes was found to be well explained by the model, as the R-squared measure was 97%.

Table 2.3: Econometric Regression Results

```
Prais-Winsten AR(1) regression -- iterated estimates

      Source |       SS           df       MS            Number of obs   =        33
-------------+----------------------------------         F(1, 31)        =   1116.90
       Model |  6.67487476         1  6.67487476         Prob > F        =    0.0000
    Residual |  .18526431         31  .005976268         R-squared       =    0.9730
-------------+----------------------------------         Adj R-squared   =    0.9721
       Total |  6.86013907        32  .214379346         Root MSE        =    .07731


-------------------------------------------------------------------------------
      lndpton |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
-------------+-----------------------------------------------------------------
    lngdp_oecd |    .904802   .1444524     6.26    0.000     .6101894    1.199415
         _cons | -1.196227    1.77442    -0.67    0.505    -4.815181    2.422727
-------------+-----------------------------------------------------------------
          rho |   .9228429
-------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.208629
Durbin-Watson statistic (transformed) 1.756154
```

Source: Indecon regression analysis using STATA software

It could be argued that a more complex multi-variate econometric model is more appropriate. However, such an approach is also subject to many of the same problems as a univariate approach. Indecon believes that applying a parsimonious approach is appropriate. This is especially true given the strong relationships that exist between port volumes and economic activity. In any economic forecast, it is also important to understand what are the key drivers that influence the forecast. In our demand model, the key driver is economic activity as proxied by growth in GDP. Both the Department of Finance (up to 2030) and the OECD have produced medium- and long-term forecasts of the Irish economy.

2.3 Long-term Growth Projections for the Irish Economy

Long-term forecasts published by the Department of Finance in Spring 2023 project GDP growth to average 4.3% per annum between 2023 and 2030. These official forecasts inform Indecon's modelling of Dublin Port tonnage projections to 2030. Growth in domestic consumption is also estimated to be very high and an average of 3.2% over this period. These are shown in Table 2.4.

Table 2.4: Department of Finance Forecasts for Irish GDP Growth - 2023-2030								
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
GDP - Annual % Growth	5.6%	4.1%	4.9%	4.4%	3.8%	3.8%	3.8%	3.7%
Personal Consumer Spending – Annual % Growth	3.9%	3.8%	3.4%	3.4%	3.1%	2.9%	2.7%	2.5%
Source: IFAC/Department of Finance, Spring 2023 long-term forecasts								

Official Irish-based long-run projections (beyond 2030) for the Irish economy are not currently available. Indecon has, however, accessed long-run economic growth projections produced by the OECD. These projections are updated periodically, with the most recent projections published in 2021.[1] These forecasts are based on the OECD's assessment of the economic climate in individual countries and the world economy, using a combination of model-based analyses and expert judgement. The OECD has predicted Ireland's GDP growth averaging around 2.6% per annum between 2023 and 2030, and between 1.5% and 2.2% per annum over 2031-2040. As with any such projections, these figures are subject to considerable uncertainty, especially given Ireland's position as a small open economy, highly dependent on trade and inward investment. The OECD research assumes that the Irish economy will transition over the next 5-10 years towards a lower growth pattern that is more typical of the world's most advanced economies. However, this could very well be a conservative estimate, particularly if Ireland continues to succeed in attracting significant foreign direct investment inflows, which in turn drive exports and imports. For this reason, Indecon has used the Department of Finance figures up to 2030 which assumes a higher trajectory for GDP growth. In order to avoid a sharp drop between DoF and OECD forecasts, Indecon has smoothed the growth rates for 2030-2040. It is also important that a realistic higher growth scenario is considered, particularly from a planning perspective.

These two scenarios are depicted in the figure below.

Figure 2.5: Irish GDP Growth – Alternative Scenarios

Source: Indecon analysis based on Department of Finance and OECD projections

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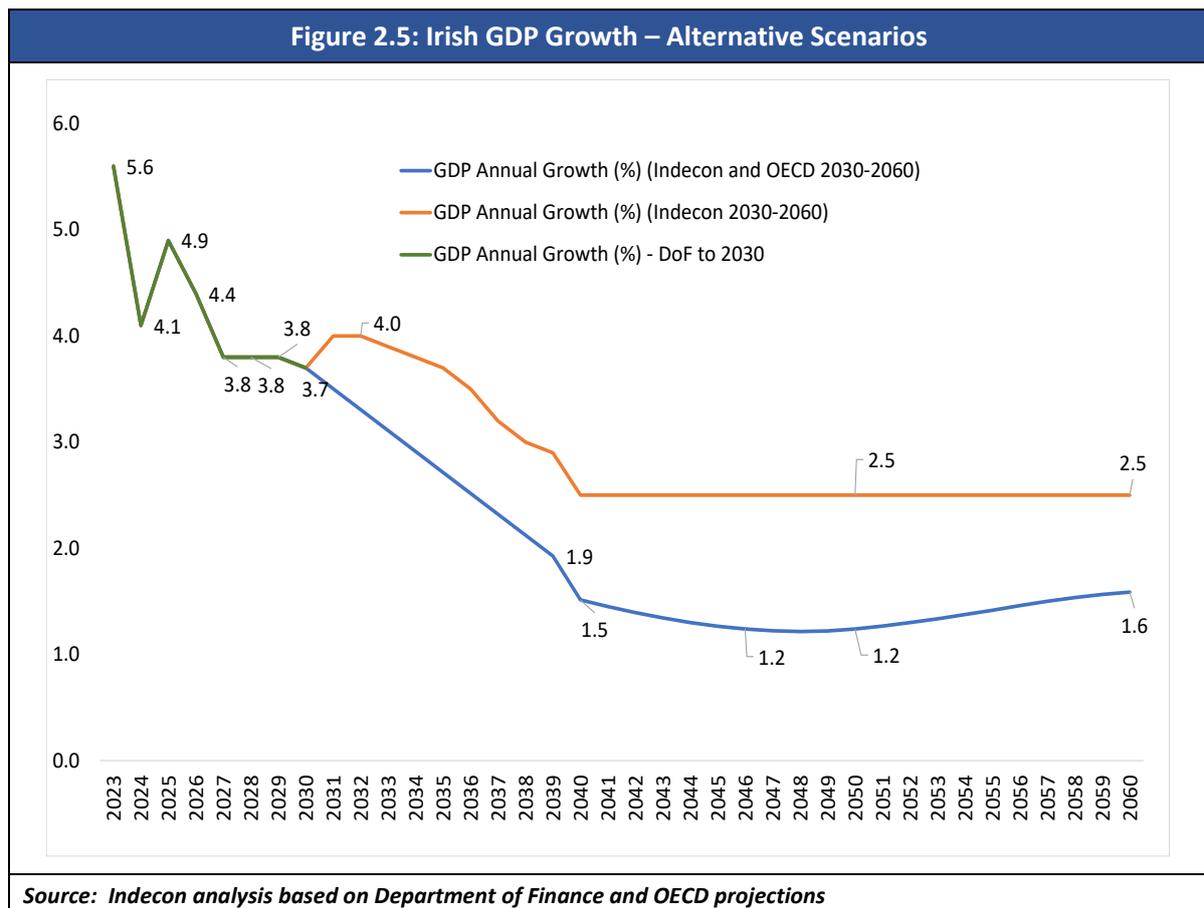
[1] OECD, Long-term baseline projections, No. 109 (Edition 2021). See: https://data.oecd.org/gdp/real-gdp-long-term-forecast.htm.

2.4   Scenarios Dublin Port Trade Volumes

The above alternative scenarios for annual GDP growth were then used in combination with the results of Indecon's econometric analysis to develop alternative predictions for Dublin Port's trade volumes. These alternative forecasts are depicted in the figure below. Based on the base-case projections for Irish GDP growth, it is estimated that Dublin Port tonnage would not reach over 70 million gross tonnes until after 2050. In contrast, Indecon's higher growth scenario suggests port throughput would reach the 77 million tonnes set out in the port's Masterplan by around 2047. Indecon would reiterate the huge level of uncertainty attached to any such projections. It is possible that Irish GDP growth could turn out even higher than assumed in the high growth scenario described above, particularly if Ireland continues to benefit from an expanding multinational sector which requires imported capital and producer goods inputs and exports large volumes of finished goods to European markets. Continued expansion in Ireland's agri-food sector could also drive higher export growth among high-value dairy and other food products.

Figure 2.6: Alternative Scenarios for Dublin Port Trade Volumes (Gross Tonnes) – Updated to Reflect latest DoF Forecasts published in April 2023

Source: Indecon analysis
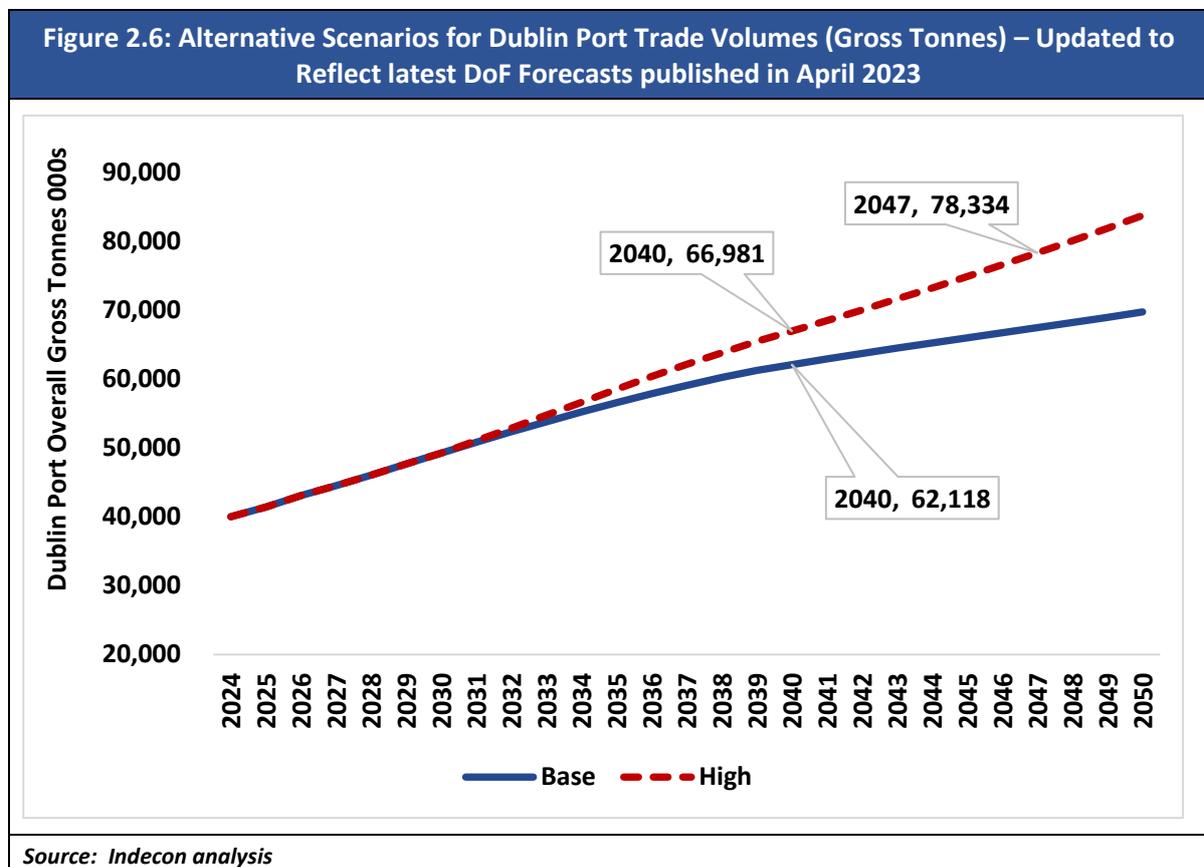
These overall tonnage projections are then distributed into different modes based on observed trends in modal activity at Dublin Port. As discussed previously, the growth in RoRo has been significantly higher than LoLo (in gross tonnage terms). Our forecast assumes that this recent trend will continue. There are no plans to increase the capacity of bulk at the Port and the likely volumes of bulk will remain similar to 2022 levels.

Table 2.5: Overview of Key Outputs (Demand Analysis)			
	2022-2030	**2031-2040**	**2041+**
Average % Growth Rate (RoRo) – Base	4.4%	3.2%	1.3%
Average % Growth Rate (RoRo) – High	4.4%	4.2%	2.6%
Average Share (RoRo) (Current/2022 = 60.8%)	62.5%	67.8%	70.4%
Average % Growth Rate (LoLo) – Base	3.2%	2.0%	1.3%
Average % Growth Rate (LoLo) – High	3.2%	2.8%	2.6%
Average Share (LoLo) (Current = 20.6%)	20.4%	20.0%	19.8%
Source: Indecon analysis			

2.4.1 Sensitivity analysis

As discussed above, there is significant uncertainty associated with any demand forecasting exercise. This is especially true for one such as port volumes which are strongly linked to developments in the domestic and global economies. One important sensitivity that we have considered is in relation to the appropriate driver of economic activity. In our base case, we have used GDP growth rates as our proxy for economic activity. It is possible that private consumption in the domestic economy may be a better indicator. However, Indecon believes that the structure of the Irish economy is such that the economic activity indicator needs to explicitly capture the impact of exports on port volumes. Research by the OECD suggests that the import content of Ireland's exports is around 43%. This is around five times higher than the OECD average.

We analyse the relationship between private consumptions and port volumes using the same econometric model. The econometric model indicates a strong positive historical relationship between port volumes at Dublin Port and domestic private consumption. There is little difference between the models in the overall levels of gross tonnage. This mainly relates to the economic drivers being highly correlated. The Department of Finance produced a forecast for private consumption up to 2030, and we use the differential between this and GDP to update the OECD forecasts accordingly.

Figure 2.7: Alternative Scenarios for Dublin Port Trade Volumes (Gross Tonnes) – Updated to Reflect latest DoF Forecasts published in April 2023 (Based on Private Consumption)
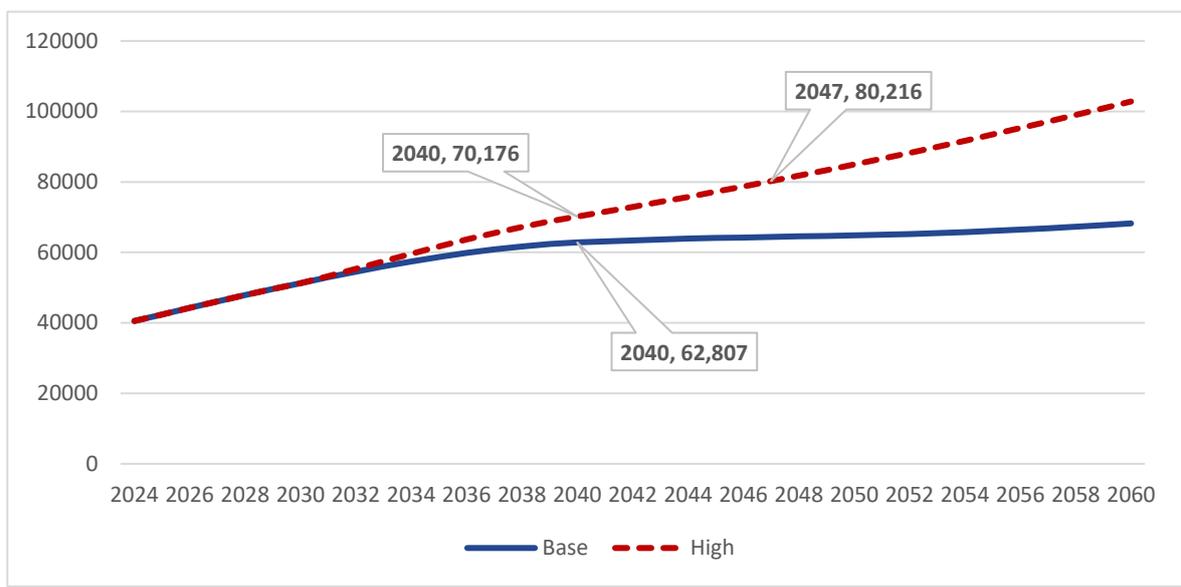
Source: Indecon analysis

Uncertainty of forecasts

As with any forecast of the future, there is inherent uncertainty with the analysis and there are likely to be a number of factors that could influence the relationship between economic activity and port volumes at Dublin Port. The most recent evidence indicates that the relationship between economic activity in the Irish economy and port volumes at Dublin Port remains strong.

There are a number of factors that could impact this relationship both in a positive or negative fashion. The continuing impact of Brexit has a major impact on operations at Dublin Port. The overall level of tonnage has remained at similar levels, but the way this tonnage has moved between Ireland and mainland Europe has changed significantly. There has been a significant reduction in the use of the Landbridge which has led to more direct sailings to continental Europe. This has meant that RoRo is now typically non-accompanied in contrast to the Landbridge model which was mainly accompanied RoRo. This has significant implications for space requirements at Dublin Port.

The other main shock to port volumes in recent years is related to the COVID-19 pandemic. However, the economy and Dublin Port have both bounced back quickly from this shock. This highlights the strong relationship between the two indicators.

There are other factors that could weaken (or decouple) the relationship between port volumes and economic activity. One such factor is the circular economy which would lead to lower levels of consumption which may reduce imports and associated port volumes. However, there is no evidence at this point to support this potential impact. It must also be noted that the import content of Ireland's exports is 43%, which is five times higher than the OECD average. The current structure of the economy is such that it is reliant on a fully functioning port system to import and export goods and materials. Ireland is a small open economy that is heavily reliant on export markets to support growth.

3 Demand-Capacity Modelling and Scenarios

3.1 Introduction

This section firstly outlines Dublin Port's plans in relation to capacity enhancements under the port's Masterplan 2040, in addition to assumptions applied in the demand-capacity modelling. Baseline scenarios are then presented for RoRo and LoLo trades. This is followed by an assessment of the potential implications of specific developments that could impact land availability. We also assess the potential economic losses that could arise from a failure to ensure sufficient future port capacity to meet the projected growth in demand.

3.2 Planned Capacity Enhancements

Maximising the efficient utilisation of scarce land is a key requirement in determining the available capacity for a port to serve its customers. The intensity of utilisation of Dublin Port's estate (described in Annex 2) will continue to evolve under the port's Masterplan. In particular, the Masterplan sets out significant planned investments, which will enable the port to significantly increase both its RoRo and LoLo capacity compared to current levels. The table below sets out the base case modelling assumptions (as per the Masterplan) in respect of the timing of planned enhancements to RoRo capacity over the period to 2040.

Table 3.1: Capacity Analysis – Base Case Assumptions re Planned RoRo Capacity					
Location	Current Area Ha (2022)	Total RoRo Units (2022)	Future Area (Ha) (2040)	Total RoRo Units (2040)	Year of Capacity Uplift
A1	10.7	214,000	10.7	214,000	No change
A2	4.1	82,000	4.1	82,000	No change
B	1.6	32,722	8.2	164,000	2026
C	21.2	686,880	38.8	1,164,000	2031 (MP2)
D2	2.8	56,000	2.8	0	2027
E1	3.2	0	3.2	64,000	2038
E2	3.6	0	3.6	72,000	2026-2030
E3	4.4	0	4.4	88,000	2029-2038
E4	3.5	0	3.5	70,000	2028-2037
E5	1.6	0	1.6	32,000	2029
E6	1.9	0	1.9	38,000	2031
E7	2.3	0	2.3	46,000	2036
E8	1.2	0	1.2	24,000	2025-2036
F	3	0	3	60,000	2025-2027
H1	1.2	24,000	1.88	37,600	2024
K1	10.2	0	12.6	252,000	2038 (3FM)
R	6	60,000	6	60,000	No change
T9	1.9	0	1.9	12,900	2028
Grand Total	**47.6**	**1,155,602**	**108.9**	**2,480,500**	
Source: Dublin Port Company					

The table below sets out the base case modelling assumptions (as per the Masterplan) in relation to planned enhancements to LoLo capacity.

Table 3.2: Capacity Analysis – Base Case Assumptions re Planned LoLo Capacity					
Location	Current Area Ha (2022)	Total LoLo Units (2022)	Future Area (Ha) (2040)	Total LoLo Units (2040)	Year of Capacity Uplift
D1	14.46	303,660	15.7	471,000	2033 (MP2)
D2	2.8	0	2.8	84,000	2029
I1	7.425	222,750	7.425	222,750	No change
I2	3.8	75,240	3.8	114,000	2028
K1	10.2	306,000	12.6	0	(2036-2037) (3FM)
N	9.3	0	9.1	384,000	2036 (3FM)
O	7.4	0	5.9	216,000	2037 (3FM)
J1	0	0	4.25	85,000	2028-2030
Grand Total	**35.9**	**907,650**	**49.0**	**1,576,750**	
Source: Dublin Port Company					

The timing of when additional capacity becomes available will be important in identifying potential pinch points. Typically demand at Dublin Port grows in a linear fashion, whereas capacity enhancement tend to be relatively lumpy, which can create pinch points but also periods of excess capacity. The key assumptions that determine capacity (alongside the land available) include:

➢ Throughput assumptions for RoRo and LoLo

➢ Level of Accompanied or Non-Accompanied

➢ Space availability (including the return of Brexit lands)

➢ Headroom Assumptions[2]

The capacity model enables DPC to test the impact of different assumptions on these key drivers. The base case assumptions (as per the Masterplan) in relation to capacity are in line with the most efficient ports in the EU. For example, the LoLo assumption of 30,000 per Ha is significantly higher than the European average of around 20,000 LoLo units per Ha. Dublin Port has examined these assumptions and assessed them against current operators of the port infrastructure. These assumptions are reflective of the current average efficiency at the port.

Dublin Port will monitor the actual levels of efficiency achieved across the estate to ensure the best use of space available land is made. However, given increases in demand for exports and imports, it is still likely that capacity constraints will emerge without new infrastructure investment. The new LoLo infrastructure envisaged as part of 3FM is likely to be more efficient than the existing infrastructure due to technological advances.

The key assumptions that underpin the capacity model are shown in Table 3.3.

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[2] This relates to percentage of spare capacity that is needed to account for disruptions to normal operations. It is a standard assumption in the estimation of maximum available capacity of infrastructure.

Table 3.3: Overview of Key Supply-side Assumptions (Capacity Analysis) – Base Case Assumptions	
LoLo throughput (Units per Ha)	30,000
RoRo throughput (Units per Ha) – Accompanied	40,000
RoRo throughput (Units per Ha) – Non-Accompanied	20,000
Headroom/Stretch Capacity Assumption	5%
Source: Modelling assumptions based on inputs from Dublin Port Company	

3.3   Baseline Demand-Capacity Model

The baseline model for RoRo is shown in Figure 3.1. This integrates the demand scenarios with the baseline assumptions on capacity developments at Dublin Port out to 2040.

Figure 3.1: Baseline RoRo Model (Capacity enhancements as per Masterplan)
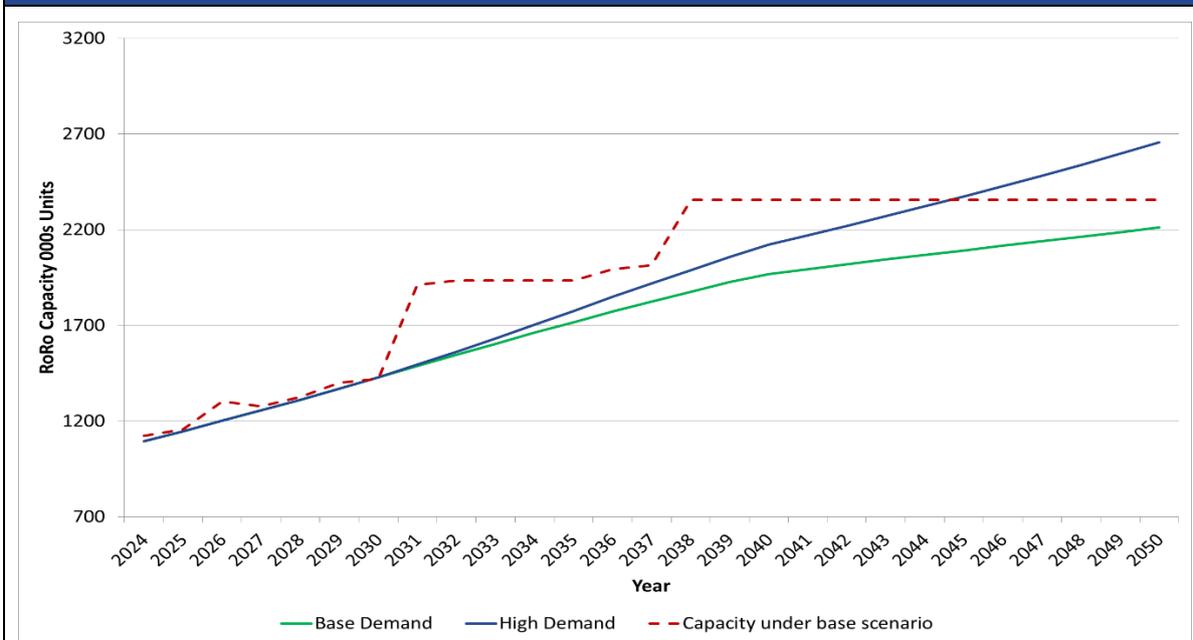
Source: Indecon Demand-Capacity Model

The significant future investment planned in RoRo capacity at Dublin means that Dublin Port is likely to have sufficient capacity until at least 2050 under the base case demand model. However, under the higher demand model, Dublin Port is likely to face capacity constraints by around 2045. As the graphic in Figure 3.2 shows, demand typically grows in a linear fashion, but the timing of additional capacity enhancements is concentrated over shorter periods. The Demand-Capacity Model also shows that Dublin Port will be close to capacity for the rest of the 2020s if demand continues to grow in line with the historic statistical relationship. The latest data for 2022 indicates that Dublin Port handled just over 1 million RoRo units. The estimated current capacity is around 1.1 million RoRo units which indicates that the port is currently operating at around 91% capacity. This makes no

allowance for the need for some headroom capacity. The baseline model assumes the return of the Brexit lands which will provide additional RoRo capacity in the short and medium term.

The Demand-Capacity Model also analyses the likely developments in LoLo traffic at the Port. The baseline scenario is shown in Figure 3.2 and shows the significant capacity constraints for LoLo at Dublin Port. These will remain until the completion of the MP2 project. Currently, some LoLo capacity is catering for RoRo traffic but this will revert back to LoLo in the coming years. If all the planned infrastructure improvements continue as planned, then it is likely that there will be sufficient LoLo capacity until around 2050 under a base demand scenario. If demand grows faster than this, then LoLo capacity will be reached around 5-6 years earlier. It also should be noted that under 3FM, it is planned that some existing LoLo capacity becomes RoRo. If 3FM does not continue, this will also have negative impacts on future RoRo capacity.

The current level of LoLo demand at Dublin Port in 2022 was 823,399 TEU units. The estimated level of capacity (without any allowance for headroom) was around 900,000 TEU units which indicate that LoLo capacity was at around 91% capacity. The analysis indicates that there will be very little spare LoLo capacity available at Dublin Port for the next decade.


Figure 3.2: Baseline LoLo Model (Capacity enhancements as per Masterplan)

Source: Indecon Demand-Capacity Model
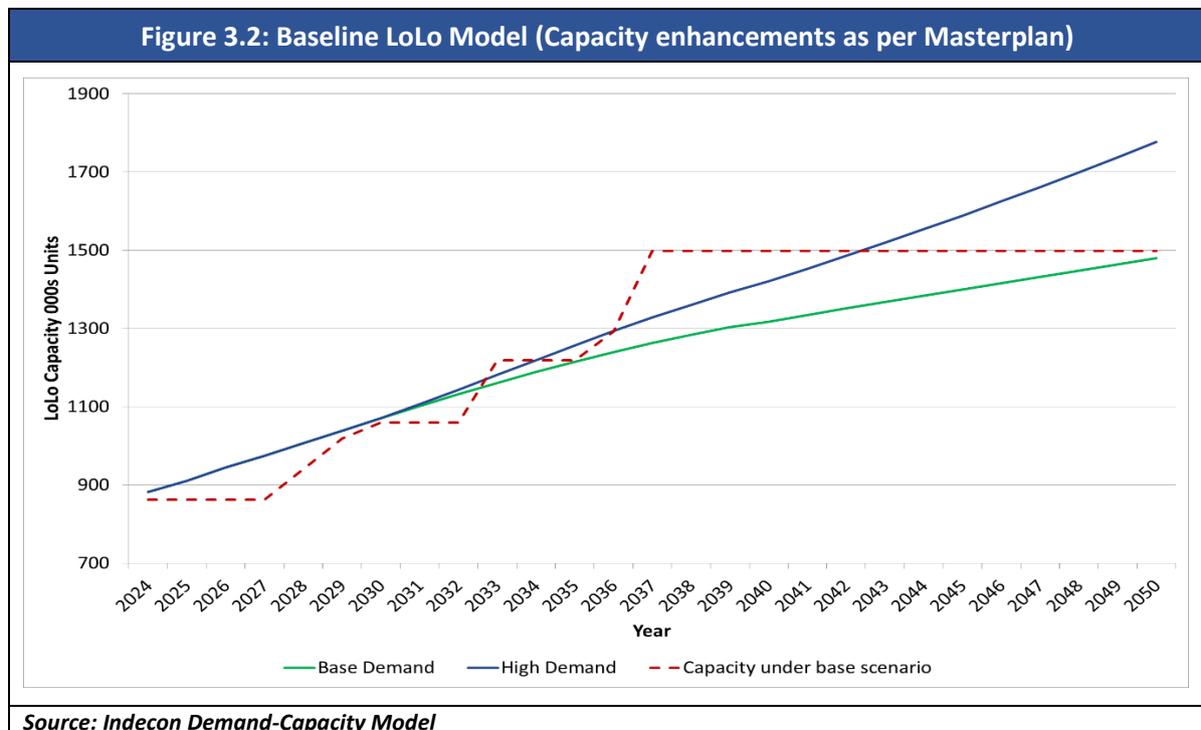
## 3.4   Potential Constraints on Future Capacity

The preceding baseline analysis assumes that additional RoRo and LoLo capacity can be delivered as per the Masterplan. This will involve significant capital investment and create operational challenges for the Port. However, there are a number of potential policy decisions that may be made, which could have significant negative implications on Dublin Port's ability to deliver these planned enhancements to capacity. Each of these factors would impact land availability on the Dublin Port estate, which would in turn reduce available capacity for cargo-related activity. These are outlined in the table below.

Table 3.4: Overview of Potential Capacity Constraints		
Restriction	**Capacity Implications**	**Years of Impact**
Non-Return of the Brexit Lands (15 Ha)	251,000 RoRo Units	2027,2031,2036
6Ha Nature Reserve**	238,000 LoLo units	2036-2037 (3FM)
Train in Alex Quay	210,000 LoLo units	2028
Train in Southern Port	125,000 LoLo units	2036-2037 (3FM)
Total Impact***	573,000 LoLo units & 251,000 RoRo Units	

Source: Indecon analysis
*Note the 3FM project also provides additional RoRo capacity that would remain as LoLo if 3FM did not proceed
** Note potential knock-on impacts on capacity

Currently, around 15 Ha at Dublin Port is operated by various Government agencies in order to undertake various Brexit checks. As per the Masterplan, it is planned that this land would be used to provide additional RoRo capacity at the Port. Current estimates indicate that this land could support around 250,000 units of additional RoRo capacity. The impact of such a scenario is outlined in Figure 3.3. Under this scenario, Dublin Port will be unable to meet all RoRo demand until the completion of the MP2 in the early 2030s. Other capital projects such as 3FM would significantly increase RoRo capacity and would indicate that Dublin Port would have sufficient capacity until around 2045 under Indecon's base demand forecast. Under a plausible higher growth scenario, capacity is reached by around 2040.

Figure 3.3: RoRo Model – Impact of Non-Return of Brexit Lands
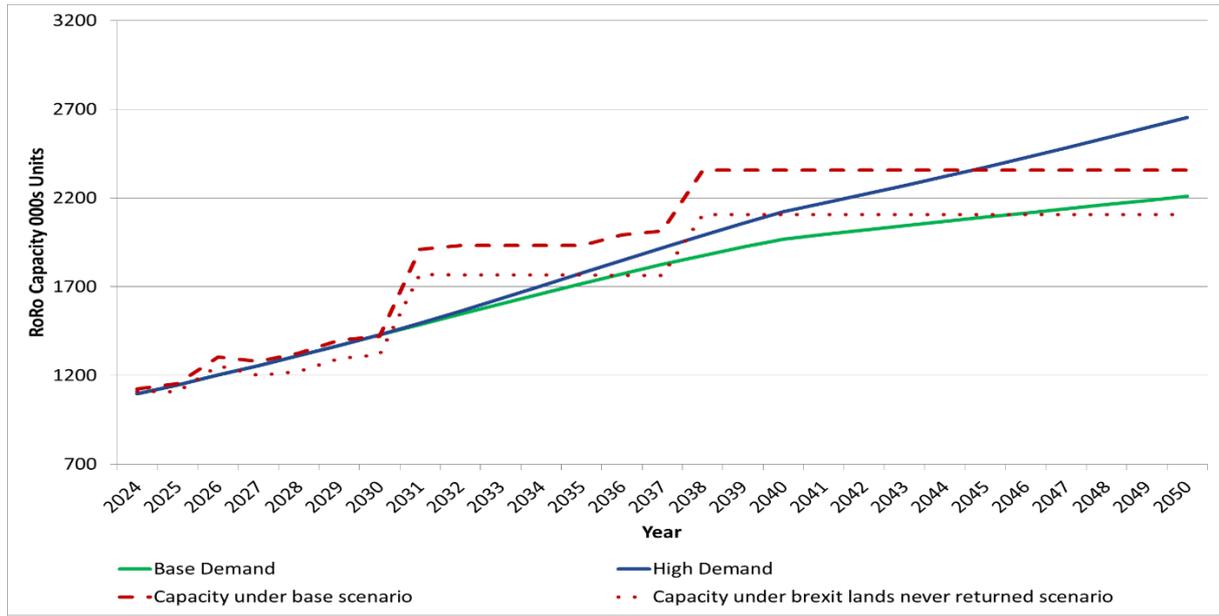
Source: Indecon Demand-Capacity Model

There are a number of issues that may impact the LoLo capacity at Dublin Port. One particular issue relates to land needed for LoLo capacity being designated as a Nature Reserve (6 Ha). At present, the 3FM project assumes that this land would be used for additional LoLo capacity. If a policy decision was made to designate this as a Nature Reserve, then the overall viability of the 3FM project would come into question. There will also be an impact on RoRo capacity.

Figure 3.4: LoLo Model – Impact of Nature Reserve (6Ha)
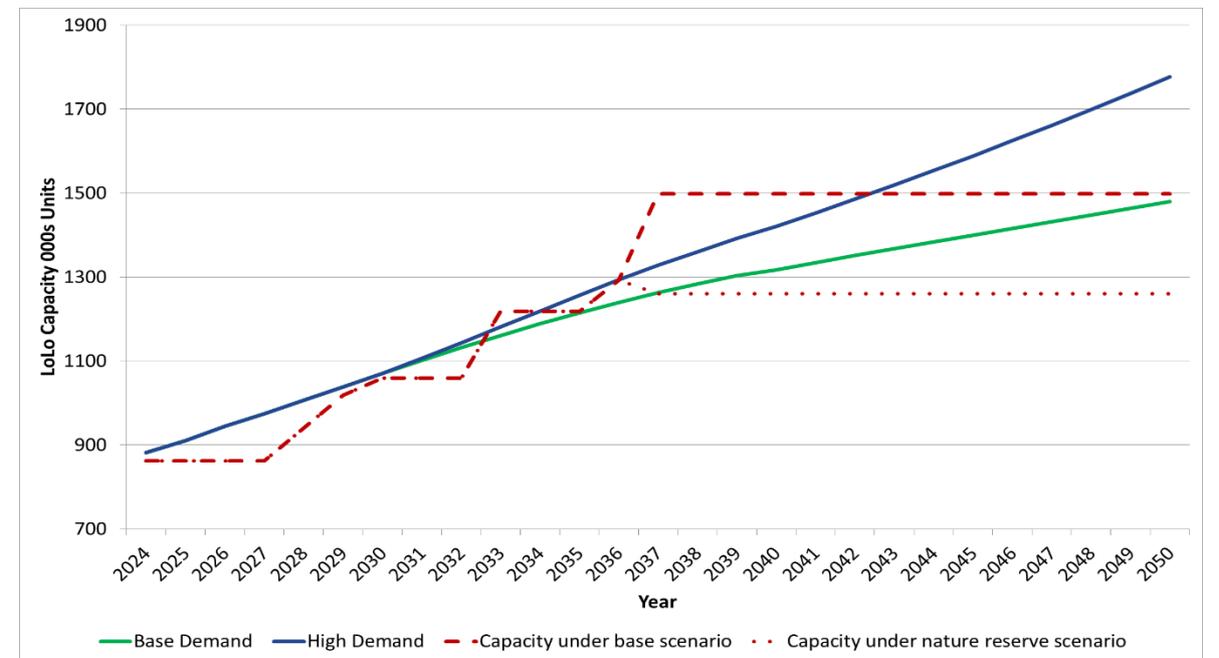
Source: Indecon Demand-Capacity Model

Any decisions to increase rail access at the port are also likely to have a direct impact on LoLo capacity. Combined with the Nature Reserve, the impact of such a decision would be that Dublin Port would handle LoLo volumes in 2050 that are very similar to 2022 volumes. There would be some additional RoRo capacity (through MP2), but this would be limited if the Brexit Lands were not returned. There are no plans in place in other ports in Ireland to meet these levels of unmet demand. This could have significant negative consequences for the Irish economy.

3.5   Potential Costs of Failure to Address Capacity Constraints

There are a number of potential capacity constraints that may impact Dublin Port's ability to service these projected levels of tonnage demand. This will likely mean that some level of trade will need to be diverted to other more distant ports (creating potential negative environmental impacts) or result in a loss of this trade to Ireland. This may have an impact on the State's ability to meet ambitious policy targets in housing, renewable energy, transport, and exports as there will not be sufficient port capacity to import the raw materials needed. Given Ireland's status as a small open economy that relies heavily on exports and imports, there are potentially very substantial economic losses that would arise if sufficient port capacity were not provided to meet the projected increase in demand resulting from economic growth.

Indecon has developed a model that estimates the value of the potential trade lost at Dublin Port if capacity is not sufficient to meet future demand. The model is based on data from Eurostat which measures the levels of sea-based trade with non-EU countries along with activity at Dublin Port. The Eurostat data indicates that the value of each tonne of sea-based trade is approximately €1,500. We then assume that this average figure is applicable to all tonnage imported/exported at Dublin Port.

We consider the impact where a number of possible events occur that would significantly constrain capacity at Dublin Port. Under a situation where all of these potential constraints occur, it is possible that the loss in trade could be in the region of €9.4-10.6 billion (in 2022 prices). For context, we estimate that the value of trade handled at Dublin Port in 2022 was approximately €36-40 billion.

Table 3.5: Estimate of the Value of Trade Lost at Dublin Port if certain Capacity constraints occur (Annual estimates based on 2022 values)		
Restriction	**Capacity Implications**	**(€ billion)**
Return of the Brexit Lands (15 Ha)	251,000 RoRo Units	€5.0-5.6
6Ha Nature Reserve**	238,000 LoLo units	€1.8-2.1
Train in Alex Quay	210,000 LoLo units	€1.6-1.8
Train in Southern Port	125,000 LoLo units	€1.0-1.1
Total Gross Impact***	573,000 LoLo units & 251,000 RoRo Units	€9.4-10.6

Source: Indecon analysis
*Note the 3FM project also provides additional RoRo capacity that would remain as LoLo if 3FM did not proceed
** Note potential knock-on impacts for RoRo capacity
*** These are Gross estimates – it is likely that some of this trade may be diverted to other more distant ports on the island of Ireland

Annex 1   Additional Supporting Analysis (Demand Analysis)

Correlation Analysis – <u>Based on 1980-2021 (Absolute Value Data)</u>						
Correlation between:	**GNP**	**GDP**	**Population**	**Private Consumption**	**Economy-wide Goods Imports**	**Economy-wide Goods Exports**
Dublin Port Overall Tonnage	0.96	0.95	0.95	0.98	0.97	0.96
Dublin Port Export Tonnage	0.96	0.95	0.97	0.98	0.97	0.96
Dublin Port Import Tonnage	0.95	0.93	0.93	0.98	0.97	0.96
Source: Indecon analysis						

Correlation Analysis – <u>Based on 1980-1999 (Absolute Value Data)</u>						
Correlation between:	**GNP**	**GDP**	**Population**	**Private Consumption**	**Economy-wide Goods Imports**	**Economy-wide Goods Exports**
Dublin Port Overall Tonnage	0.96	0.95	0.86	0.87	0.96	0.95
Dublin Port Export Tonnage	0.97	0.97	0.90	0.91	0.97	0.96
Dublin Port Import Tonnage	0.95	0.93	0.83	0.83	0.94	0.93
Source: Indecon analysis						

Correlation Analysis – <u>Based on 2000-2012 (Absolute Value Data)</u>						
Correlation between:	**GNP**	**GDP**	**Population**	**Private Consumption**	**Economy-wide Goods Imports**	**Economy-wide Goods Exports**
Dublin Port Overall Tonnage	0.98	0.99	0.83	0.96	0.47	0.05
Dublin Port Export Tonnage	0.86	0.93	0.95	0.96	0.18	0.11
Dublin Port Import Tonnage	0.99	0.94	0.67	0.88	0.65	0.00
Source: Indecon analysis						

Correlation Analysis – <u>Based on 2012-2021 (Absolute Value Data)</u>						
Correlation between:	**GNP**	**GDP**	**Population**	**Private Consumption**	**Economy-wide Goods Imports**	**Economy-wide Goods Exports**
Dublin Port Overall Tonnage	0.83	0.82	0.82	0.92	0.86	0.79
Dublin Port Export Tonnage	0.78	0.77	0.79	0.88	0.82	0.75
Dublin Port Import Tonnage	0.85	0.84	0.84	0.94	0.89	0.80
Source: Indecon analysis						

Econometric Regression Results (Sensitivity Using Private Consumption)

```
Prais-Winsten AR(1) regression -- iterated estimates

      Source |      SS          df       MS          Number of obs =       32
-------------+------------------------------          F(1, 30)      =  2229.66
       Model | 11.2905639        1  11.2905639        Prob > F      =   0.0000
    Residual |  .15191406       30  .005063802        R-squared     =   0.9867
-------------+------------------------------          Adj R-squared =   0.9863
       Total |  11.442478       31  .369112193        Root MSE      =   .07116


     lndpton |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

   ln_consump |  1.334345    .09118     14.63   0.000     1.148131     1.52056
        _cons | -4.958364   1.019571    -4.86   0.000    -7.040605    -2.876122

         rho |  .6987494

Durbin-Watson statistic (original)    0.613990
Durbin-Watson statistic (transformed) 1.785914
```

Source: Indecon regression analysis using STATA software

Annex 2   Overview of Current Dublin Port Estate

Map of Dublin Port Estate

Source: Dublin Port