Port of Melbourne

Photo Source: Port of Melbourne website

Port of Melbourne Future Containership Fleet Analysis, 2022-2050

TECHNICAL REFERENCE PAPER (Final Revised, 13 December 2022)

GHD

GHD Advisory

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Port of Melbourne Future Containership Fleet Analysis

1.1 Background

GHD Advisory has been engaged by the Port of Melbourne (PoM) to undertake regular monitoring of developments in the Global and Melbourne-calling Containership Fleets as well as the provision of Containership Fleet Visits Forecasts which model the possible composition, by nominal TEU size class, of containership visits to international container berths at the Port of Melbourne.

This document is a Technical Reference Paper outlining the analysis of global containership fleet developments and the modelling of possible containership fleet visits as part of future development planning for port container capacity and large-ship access to the Swanson Dock precinct. Due to the recent exceptional shipping market developments over the last two years and ongoing (relating to the COVID-19 pandemic, associated overseas port congestion, and abnormally high rates/profits for carriers), the modelling includes two Scenarios (A and B – see Section 4.8 for details) to help 'book-end' possible future developments in the shipping markets. The results of the future fleet visits modelling are being used as input for capacity modelling of Swanson and Webb Docks.

The estimated future fleet visits and vessel size compositions may change subject to any future changes in the assumptions used and industry operational decision-making concerning market supply/demand developments, service level coverage on trade-lanes, port access developments along shipping routes, and carrier partnering arrangements.

1.2 Scope

The Scope of the analysis covers:

- Review of global containership fleet developments in terms of containership sizes in service and on order, and the fleet visiting the Port of Melbourne
- International containerships visiting berths at the Port of Melbourne (Swanson Dock and Webb Dock precincts) on a regular (scheduled service) basis – this forms the modelling current baseline
- Bass Strait domestic roll-on/roll-off containerships are excluded
- Future period of FY2021-22 to FY2049-50 inclusive, with specified assumptions used to model the future period.

Developments in the Global Containership Fleet

2.1 Deployed Global Containership Fleet – Size class composition (Q4 2022)

Outlook Indicators:

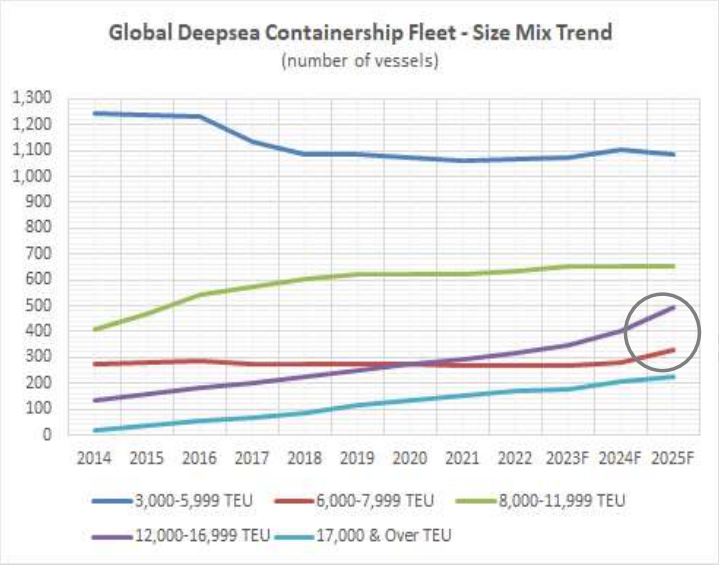
1. Melbourne historic workhorse size class of **3,000-5,999 TEU has bottomed out*.** Forecast 1,082 vessels by 2025 (= back to 2019).
2. Melbourne historic upper size class **of 6,000-7,999 TEU has turned to growth***. Forecast 328 vessels by 2025 (= record high).
3. Melbourne relevant Neo-Panamax size class of **8,000-16,999 TEU still rapidly increasing***. Forecast 1,147 vessels by 2025. Sub-class 12-16,999 TEU driving growth. Sub-class 8-11,999 TEU less growth.

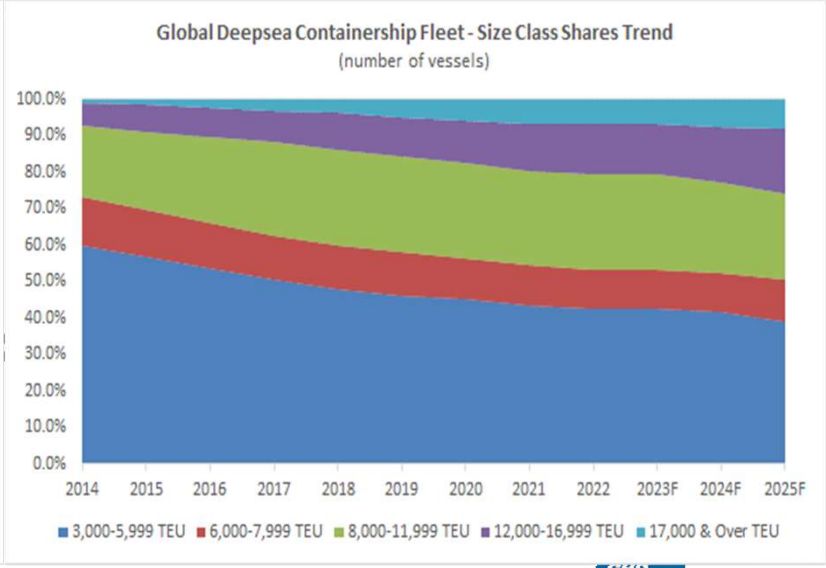
(*) **Net of Deliveries & Demolitions**

Source: GHD analysis of Clarksons SIN Quarterly Containership Market Review, Q4 2022

Table 1 Global Containership Fleet – Size class composition & development (Q4 2022)

Start Year	Feeder 100-2,999		Intermediate 3,000-5,999		Intermediate 6,000-7,999		Neo-Panamax 8,000-11,999		Neo-Panamax 12,000-16,999		Post-Panamax 17,000+		Total Fleet	
	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU
2014	3,056	4,121.2	1,244	5,545.0	277	1,848.4	409	3,690.9	133	1,785.7	18	319.4	**5,137**	**17,310.6**
2015	2,992	4,049.0	1,235	5,526.6	282	1,881.2	467	4,238.2	160	2,155.7	34	612.1	**5,170**	**18,462.9**
2016	2,987	4,050.4	1,231	5,516.5	285	1,901.7	542	4,942.9	182	2,473.8	57	1,038.5	**5,284**	**19,923.7**
2017	2,962	3,979.6	1,137	5,093.8	275	1,837.6	576	5,273.7	199	2,719.9	69	1,268.0	**5,218**	**20,172.6**
2018	2,957	3,985.0	1,085	4,852.6	273	1,825.4	603	5,559.0	223	3,065.4	88	1,654.4	**5,229**	**20,941.9**
2019	3,000	4,083.4	1,083	4,836.2	273	1,825.4	621	5,755.8	249	3,435.6	114	2,180.0	**5,340**	**22,116.4**
2020	3,030	4,145.4	1,073	4,780.3	273	1,825.4	623	5,779.4	274	3,788.8	137	2,680.8	**5,410**	**23,000.1**
2021	3,067	4,258.7	1,063	4,723.0	270	1,804.6	623	5,780.8	291	4,020.0	154	3,083.7	**5,468**	**23,670.7**
2022	3,154	4,431.0	1,069	4,743.6	270	1,804.6	636	5,932.2	318	4,417.2	168	3,413.4	**5,615**	**24,742.0**
2023(f)		4,635.2		4,768.5		1,804.6		6,072.8		4,809.5		3,554.6		**25,645.3**
2024(f)		4,847.9		4,897.6		1,884.0		6,104.4		5,601.8		4,186.3		**27,522.1**
2025(f)		4,657.7		4,802.1		2,192.0		6,103.6		6,837.1		4,531.9		**29,124.4**
% capacity growth														
2022(f)		*4.6%*		*0.5%*		*0.0%*		*2.4%*		*8.9%*		*4.1%*		***3.7%***
2023(f)		*4.6%*		*2.7%*		*4.4%*		*0.5%*		*16.5%*		*17.8%*		***7.3%***
2024(f)		*-3.9%*		*-2.0%*		*16.3%*		*0.0%*		*22.1%*		*8.3%*		***5.8%***





Developments in the Global Containership Fleet

2.2a Global Containership Fleet – Vessel Order Book (Q4 2022)

Outlook Indicators:

1. Vessel Orderbook for Melbourne **3,000-5,999 TEU size class has turned** with **129** vessels, **but** likely **most for Intra Asia trades**.
2. Vessel Orderbook for Melbourne **6,000-7,999 TEU size class has turned with 114** (first orders since 2013/15).
3. Vessel Orderbook for Melbourne Neo-Panamax **8,000-10,999 TEU size class has 20** (first orders since 2015/16).
4. Vessel Orderbook for Melbourne Neo-Panamax **11,000-11,999 TEU size class at 16** (declining interest).
5. Vessel Orderbook for Melbourne Neo-Panamax **12,000-12,999 TEU size low at 3** (drying-up).
6. Vessel Orderbook for Melbourne Neo-Panamax **13,000-13,999 TEU size at 55** (still popular).

Table 2 Global Containership Fleet – Orderbook (Oct. 2022)

Start	Feeder 100-2,999		Intermediate 3,000-5,999		Intermediate 6,000-7,999		Neo-Panamax 8,000-11,999		Neo-Panamax 12,000-16,999		Post-Panamax 17,000+		Total Orderbook	
	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU	No.	,000 TEU
Oct-22	360	664.5	129	521.5	114	810.7	36	345.6	225	3,326.8	52	1,227.3	**916**	**6,896.4**
% of Flt	11%	14%	12%	11%	42%	45%	6%	6%	69%	74%	31%	36%	**16.0%**	**27.1%**
For delivery in:														
2022	45	86.3	9	32.6	1	6.0	2	23.6	11	155.8	3	72.1	**71**	**376.5**
2023	185	351.3	61	235.3	15	102.2	4	47.0	67	987.5	31	733.2	**363**	**2,456.5**
2024	124	218.1	57	244.4	72	515.6	7	59.4	97	1,427.1	13	306.0	**370**	**2,770.7**
2025+	6	8.7	2	9.2	26	186.9	23	215.6	50	756.3	5	116.0	**112**	**1,292.7**

Table 3 Global Containership Fleet – Orderbook with further detailing by size class (Oct. 2022)

TEU Size up to 14,000 TEU	Number vessels On Order (per Oct. 2022)	Remarks
3,000-5,999	129 (of which only **10** possibly relevant)	Majority for Intra Asia trade; 10 x 5,500 TEU CMA CGM
6,000-7,999	**114** (first new orders since 2013/15)	25 x 7,000 TEU Seaspan; 15 x 6,998/7,000 TEU CMA CGM; 9 x 7,900 TEU CMA CGM; 6 x 7,900 TEU MSC; remainder for Intra Asia trade or unknown
8,000-10,999	**20** (first new orders since 2015/16)	10 x 8,100 TEU MSC; remainder unknown
11,000-11,999	**16** (declining)	10 x 11,400 TEU MSC; remainder Asian owners
12,000-12,999	**3** (drying-up)	Asian owner (RCL)
13,000-13,999	**55** (still popular)	12 x 13,000 TEU HMM; 6 x 13,000 TEU CMA CGM; 10 x 13,700 TEU ONE; remainder Asian owners

Source: GHD analysis of Clarksons SIN Quarterly Containership Market Review, Q4 2022

Developments in the Global Containership Fleet

2.2b Vessel Order Book (Oct. 2022) – Implications for Port of Melbourne Access

Table 4 Vessel Orderbook – Implications for Port of Melbourne Access

TEU Size Class	Port of Melbourne Access*	Number vessels On Order (per Oct. 2022)	Remarks
3,000-5,999	All Docks (Swanson & Webb)	129 (of which only **10** possibly relevant to PoM)	Majority for Intra Asia trade; 10 x 5,500 TEU CMA CGM
6,000-7,999	All Docks (Swanson & Webb)	**114** (first new orders since 2013/15)	25 x 7,000 TEU Seaspan; 15 x 6,998/7,000 TEU CMA CGM; 9 x 7,900 TEU CMA CGM; 6 x 7,900 TEU MSC; remainder for Intra Asia trade or unknown
8,000-9,999	All Docks (Swanson & Webb)	**20** (first new orders since 2015/16)	10 x 8,100 TEU MSC; remainder unknown
10,000-10,999	Webb Dock Only	**0** (last ordered 2015/16)	Size range continues to be skipped
11,000-11,999	Webb Dock Only	**16** (declining)	10 x 11,400 TEU MSC; remainder Asian owners
12,000-12,999	Webb Dock Only	**3** (drying-up)	Asian owner (RCL)
13,000-13,999	Webb Dock Only	**55** (still popular)	12 x 13,000 TEU HMM; 6 x 13,000 TEU CMA CGM; 10 x 13,700 TEU ONE; remainder Asian owners
14,000-14,999	Heads Constrained**	**12** (declining)	For East-West trades (COSCO, etc.)
15,000-15,999	Heads Constrained**	**97** (popular)	For East-West trades (Evergreen, CMA, Seaspan, etc.)
16,000-16,999	Heads Constrained**	**58** (increasingly popular)	For East-West trades (COSCO, Maersk-methanol, etc.)
17,000-22,999	Heads Constrained**	**0**	Previously for East-West trades
23,000+	Heads Constrained**	**52** (popular)	For East-West trades (Evergreen, OOCL, Hapag, etc.)

(*) **Swanson Dock Max. Vessel Size of 10,000 TEU** assumed to be max. LOA 337m x Beam 45.6m, and LOA 316m x 48.2m with max. operating draught of 14.0m and 50.1m air draught passing under the Westgate Bridge (WGB).

(**) **Webb Dock & Heads Max. Vessel Size of 14,000 TEU** assumed to be ultimate max. LOA 366m x Beam 51m with max. operating draught of 14.0m. Currently, Webb max. is LOA 347m with LOA 350m (trial). There may be a limited scope for vessels up to 18,000 TEU to pass the Heads.

Source: GHD analysis of Clarksons SIN Quarterly Containership Market Review, Q1 2022

Developments in the Global Containership Fleet

2.3 Global Containership Fleet – Key Changes since Last Analysis (2022 vs. 2021)

Table 5 Global Containership Fleet – Summary of Key Changes since Last Analysis (2022 vs. 2021)

Global Fleet - Key Changes	7/2017	7/2018	10/2019	1/2021	10/2022	*Change*	*% Change*	Comment
1. Size-classes (# Vessels)								
- 3,000 to 5,999 TEU	1,140	1,088	1,077	1,066	1,069	*3*	*0.3%*	Stable since last 2021 Analysis
- 6,000 to 7,999 TEU	272	270	270	267	270	*3*	*1.1%*	Stable since last 2021 Analysis
- 8,000 to 11,999 TEU	576	603	623	623	636	*13*	*2.1%*	Small Increase since last 2021 Analysis
- 12,000 to 16,999 TEU	190	210	274	291	318	*27*	*9.3%*	Further Rapid Increase since last 2021 Analysis
- 17,000 & Over TEU	78	101	137	154	168	*14*	*9.1%*	Further Rapid Increase, but all East-West Trades
Total Fleet >3,000 TEU	2,256	2,272	2,381	2,401	2,461	*60*	*2.5%*	Overall Gradual Increase in Vessel Numbers
2. Average Age (Years)								
- 3,000 to 5,999 TEU	10.5	11.2	12.2	13.3	15.0	*1.7*	*12.8%*	Further Ageing since last 2021 Analysis
- 6,000 to 7,999 TEU	10.3	11.3	12.6	13.8	15.6	*1.8*	*13.0%*	Further Ageing since last 2021 Analysis
- 8,000 to 11,999 TEU	6.5	7.2	8.4	9.6	11.0	*1.4*	*14.6%*	Further Ageing since last 2021 Analysis
- 12,000 to 16,999 TEU	4.2	4.8	5.4	6.3	6.9	*0.6*	*9.5%*	Minor Ageing on a relatively Young age base
- 17,000 & Over TEU	2.7	2.7	3.3	4.0	5.3	*1.3*	*32.5%*	Minor Ageing on a relatively Young age base

Note: Changes in Global Fleet = Net of Demolitions (-), Losses (-) and Newbuild Deliveries (+).

Implications for Future View Relevant to Melbourne Since Last Analysis:

1. Confirming Continuing Aging of Global 3-6,000 TEU work-horse fleet traditionally used by Carriers for Australia-Asia & Australia-Europe Routes – **possible continued supply for Melbourne**
2. Confirming Continuing Aging of Global 6-8,000 TEU size fleet (average age of size-class now 16 years), **BUT recent New Orders for 7-8,000 TEU vessels (114) show new interest to replace class with a possible future supply source for Melbourne – Recommend monitor this**
3. Confirming Continuing **Minor Interest for Global Replacements in 8-12,000 TEU size range**
4. Confirming Continuing Global Preference by Carriers for 12-17,000 TEU size vessels

Source: GHD analysis of Clarksons SIN Quarterly Containership Market Review, 1Q 2021 & 4Q 2022.

Developments in the Global Containership Fleet

2.4 Global Containership Fleet – Detailed Size Class & Age Analysis per July 2022

Table 6 Global Containership Fleet – Detailed size class & **future age** analysis (per July 2022)

GLOBAL CONTAINERSHIP FLEET - TEU Size Class (per 21/07/2022)	Vessels Currently Globally Operating (Number)	% Share* of Current Global Fleet >2,999 TEU	Average Age (Years)	Vessels Currently on PoM Services (Number)	PoM Deployed Fleet as % Current Global Size Class*	Vessels On Order Globally (Number)	Vessels on Order Alternative fuel ready# (Number)	Vessels On Order as % Current Global Size Class*	Remaining Vessels Operational in 2030** (Number)	Remaining in 2030 of which Owned by 10 Main PoM Carriers****	Remaining Vessels Operational in 2035** (Number)	Remaining Vessels Operational in 2040** (Number)
750-999 TEU	*320*	*-*	*16*	*1*	*0.3%*	*2*	*0*	*-*	*50*	*-*	*21*	*2*
1,000-1,999 TEU	*1,362*	*-*	*14*	*14*	*1.0%*	*206*	*14M & 21L*	*-*	*753*	*-*	*553*	*350*
2,000-2,999 TEU	*763*	*-*	*14*	*25*	*3.3%*	*129*	*1M & 6L*	*-*	*401*	*-*	*349*	*225*
3,000-3,999 TEU* **	**259**	**11.4%**	**14**	**28**	**10.8%**	**71**	**4M**	**27.4%**	**175**	**55**	**112**	**80**
4,000-4,999 TEU	**536**	**23.7%**	**14**	**35**	**6.5%**	**20**	**0**	**3.7%**	**200**	**96**	**29**	**21**
5,000-5,999 TEU	**274**	**12.1%**	**16**	**29**	**10.6%**	**33**	**6M**	**12.0%**	**92**	**25**	**41**	**35**
6,000-6,999 TEU	**227**	**10.0%**	**15**	**13**	**5.7%**	**19**	**0**	**8.4%**	**81**	**30**	**23**	**19**
7,000-7,999 TEU	**43**	**1.9%**	**16**	**0**	**0.0%**	**95**	**6A & 2M**	**220.9%**	**105**	**32**	**95**	**95**
8,000-8,999 TEU	**299**	**13.2%**	**13**	**25**	**8.4%**	**28**	**14A**	**9.4%**	**186**	**113**	**52**	**28**
9,000-9,999 TEU	**179**	**7.9%**	**11**	**0**	**0.0%**	**0**	**0**	**0.0%**	**113**	**44**	**67**	**0**
10,000-10,999 TEU	**81**	**3.6%**	**9**	**0**	**0.0%**	**0**	**0**	**0.0%**	**67**	**15**	**33**	**0**
11,000-11,999 TEU	**84**	**3.7%**	**7**	**0**	**0.0%**	**20**	**10A**	**23.8%**	**83**	**33**	**73**	**41**
12,000-12,999 TEU	**31**	**1.4%**	**5**	**0**	**0.0%**	**3**	**0**	**9.7%**	**34**	**13**	**23**	**21**
13,000-13,999 TEU	**145**	**6.4%**	**9**	**0**	**0.0%**	**56**	**10A&M, 12L**	**38.6%**	**195**	**110**	**82**	**56**
14,000-14,999 TEU	**107**	**4.7%**	**6**	**0**	**0.0%**	**20**	**4A**	**18.7%**	**127**	**61**	**102**	**35**
Total Fleet (>2,999 TEU):	**2,265**	**100.0%**	**13**	**130**	**5.7%**	**365**	**68**	**16.1%**	**1,458**	**627**	**732**	**431**

Notes: (*) Based on vessel numbers. (**) Based on assumed vessel operational life of 20 years, all current Orders delivered, and no new vessel Orders placed. PoM = Port of Melbourne. Source data is Clarksons SIN (21/07/2022). (***) Size Class is typically serving Intra Regional trades (i.e. Intra Asia). (****) 10 Main PoM Carriers are CMA-CGM (incl. ANL), COSCO (incl. OOCL), Evergreen, Hapag-Lloyd, HMM, Maersk, MSC, ONE, PIL, and Yang Ming. (#) Alternative-fuel ready refers to ammonia (A), LNG (L) and methanol (M) - there are no vessels currently on order with hydrogen or fully-electric.

Implications for 2050 Future View Relevant to Melbourne and Modelling Assumptions:

1. There are **Vessels Remaining in all Melbourne size classes by 2035** (assuming 20 year life & no future orders). Possible that by 2035 new orders for 9,000-10,999 TEU size range to fill 2040 emerging gap
2. Fleet Modelling to assume that there is **sufficient supply of vessels across all size classes to 2050**

Source: GHD analysis of Clarksons SIN Global Containership Fleet Database (delivered & On Order) as of 21/07/2022.

Developments in the Global Containership Fleet

2.5 IMO new regulations (EEXI+CII) in 2023 – Potential Impacts on the Global Fleet

From 1 January 2023, it will be mandatory for all ships to calculate their attained Energy Efficiency Existing Ship Index (EEXI) to measure their energy efficiency and to initiate the collection of data for the reporting of their annual operational carbon intensity indicator (CII) and CII rating. **The IMO's CII regulation is likely to have a real impact on the deployment of the existing global containership fleet in the short- and medium- term**, since less than 1% of existing containerships (or 2.5% in TEU capacity terms) have alternative (greener) fuel capability (this rises to 22% of vessels on order or 33% in TEU capacity terms).

Table 7 Global Containership Fleet with Alternative Fuels Readiness and/or Capability (Oct. 2022)

Vessel Type	Fleet No.	% Total Fleet No.	Fleet m TEU	% Total Fleet m TEU	Orderbook No.	% Total Obk No.	Orderbook m TEU	% Total Obk m TEU
Sub-3,000 TEU	15	0.5%	0.02	0.4%	32	8.9%	0.05	7.1%
3,000-5,999 TEU	3	0.3%	0.01	0.2%				
6,000-7,999 TEU					49	43.0%	0.36	44.8%
8,000-11,999 TEU					24	66.7%	0.23	65.7%
12,000-16,999 TEU	19	5.7%	0.29	6.2%	82	36.4%	1.24	37.2%
17,000+ TEU	15	8.7%	0.32	9.1%	16	30.8%	0.37	30.5%
Total	**52**	**0.9%**	**0.64**	**2.5%**	**203**	**22.2%**	**2.25**	**32.6%**

Source: Clarksons SIN Quarterly Containership Market Review, 4Q 2022.

The IMO GHG emission targets and mandatory use of the CII as of 2023 will likely push shipping lines, combined with the use of other technical abatement measures and the ordering of 'greener' replacement vessels, to slow steam even further and deploy larger vessels for economies of scale to ensure the desired CII ratings and carbon reduction targets are met each year.

Implications for 2050 Future View Relevant to Melbourne and Modelling Assumptions:

1. **Some Lines have the possibility to introduce larger vessels on the NE Asia trade** to reduce carbon intensity by consolidating two existing services (strings) into one, i.e. 2 x 5,000 TEU vessel strings becoming a 1 x 10,000 TEU vessel string
2. **Some Lines operate services on long, multi-sector shipping routes and have the possibility to reduce carbon intensity by deploying larger more energy-efficient vessels** sailing at slower speeds, i.e. the Europe-Med. / Middle East / Australia trade route

Developments in the Melbourne-Calling Containership Fleet

3.1 Current Melbourne International Containership Fleet Deployed on Aus Routes

Analysis for period 1/10-31/12/2021 shows that:

1. Melbourne directly called by **25 scheduled container services** covering 8 shipping routes.
2. The Melbourne direct calling services require the deployment of a **Containership Fleet of total 143 vessels (105 >3,000 TEU size)**. Average age Melbourne Fleet one year younger than Global.
3. Melbourne Containership Fleet now has **25 vessels >8,000 TEU size with maximum size 9,600-10,600 TEU (nominal).**
4. **As of 2Q2022,** there are **3 new container services planned** (2 E. Asia & 1 NZ) to give **28 total.**

Port of Melbourne International Visits (Actuals, PoM reporting, CY2021)	Arr.	Dep.
Total Containership Visits	912	
Webb Dock Containership Moves with Airdraught > Westgate Bridge Airdraught Limit of 50.1m	70	81
% PoM Visits with Airdraught > Westgate Bridge Airdraught Limit of 50.1m *	8%	9%

(*) Note: These vessels may still have been able to pass under the WGB if visiting Swanson Dock if a collapsible mast is used and the vessel operating draught is 14m

Table 8 Current Melbourne-calling International Containership Fleet (Scheduled, Jan. 2022)

Shipping Route (Region)	Number Scheduled Vessels Deployed	Average Vessel Size (TEU)	Vessel Size Range (TEU)	Number & Frequency of Services
East Asia	56	5,221	1,740-8,888	9 x Weekly, & 1 x 12 days
SE Asia	42	4,888	1,809-10,622	7 x Weekly (incl. 1 with NZ calls)
N. America EC (Dedicated via Panama)	11	3,365	3,028-3,630	1 x Weekly (incl. NZ calls)
N. America WC	9	4,229	3,765-4,870	1 x Weekly (incl. NZ calls)
Europe (via Suez)	10	8,555	6,572-9,580	1 x Weekly (incl. S/SE Asia & Indian Ocean calls)
Europe (via Panama)	7	2,348	2,200-2,556	1 x 10 days (incl. N.America EC & NZ calls)
New Zealand (Dedicated)	5	1,494	1,102-2,226	2 x Weekly
S. Pacific Islands / PNG (Dedicated)	3	1,301	981-1,617	2 x 20-21 days (= 1 x 10 days)
TOTAL (excl. extra loaders)	**143 (avg. age 13 years)**	**4,798**	**981-10,622**	**25 (of which 21 weekly)**

Key observation in CY2021 – Only 82% of scheduled visits actually occurred (incl. extra loaders) compared with typical levels of 95-98% service delivery in CY2018-CY2020. The level for 1H2022 is expected to be 76%. This mirrors known global supply chain issues and port congestion for 01/2021-06/2022.

Note: Overall Weighted Average Vessel Size calculated by the number of vessels deployed on the shipping route and average vessel size on the route .

Sources: GHD analysis of Clarksons ship database (Q1 2022), PoM vessel visit data CY2021 & carrier published sailing schedules..

Developments in the Melbourne-Calling Containership Fleet

3.2 Melbourne-calling Fleet Deployed – Changes since Last Analyses (2015 – 2022)

Table 9 Melbourne-calling International Fleet – Summary of Key Changes since Last Analyses (2015 - 2022)

Melbourne Fleet - Key Changes	2015	2016	2017	2018	2019	1/2021	1/2022*	Comment (Note: Scheduled, excl. extra loaders)
1. Vessels Deployed								
- Total Fleet on services	**151**	**141**	**148**	**141**	**143**	**134**	**143**	Increased fleet size due to increased services.
- Fleet > 3,000 TEU size	119	112	115	120	115	107	105	Decreased fleet size due to less use of vessels >3,000 TEU.
- % of 3,000+ TEU > 8,000 TEU	-	-	-	**8%**	**22%**	**23%**	**24%**	Slight increase in share of 8,000+ TEU vessels.
2. Vessel Sizes (TEU)								
- Average	3,871	4,252	4,522	4,792	4,566	5,162	4,798	Reduced average size of vessels due to more Asian & NZ services with smaller vessels by minor carriers (TSL, Zim, BAL)
- Minimum	777	777	777	652	646	907	981	Reflects South Pacific Route needs
- Maximum	5,888	7,455	7,455	8,814	9,472	10,622	10,622	Continuing at limit of PoM (Westgate/Swanson) access
- Maximum on Route/Carrier	N&E Asia / OOCL	Europe / MSC	Europe / MSC	N&E Asia / COSCO	N&E Asia / COSCO	SE Asia / Maersk	SE Asia / Maersk	SE Asia & Europe (Suez) Routes drivers of Max. Ship Size (9,600 TEU MSC-Europe at Swanson, & 10,622 TEU Maersk-SE Asia at Webb)
3. Fleet Age (Years)								
- Average	10.2	10.4	10.7	10.9	12.7	13.0	13.3	Increasing ageing, slightly less than Global Fleet ageing
4. Services (strings)								
- Total Services	24	24	24	24	23	22	25	Net increase (BAL, TSL & Zim)
- Asia Route Services	14	13	13	14	14	15	17	Net increase (BAL & TSL)

(*) Note: As of 2Q2022, an additional 3 scheduled services are planned (1 x TSL, & 2 x Zim) with total 13 vessels (1,118-3,000 TEU size).

Implications for Future View Since Last Analysis:

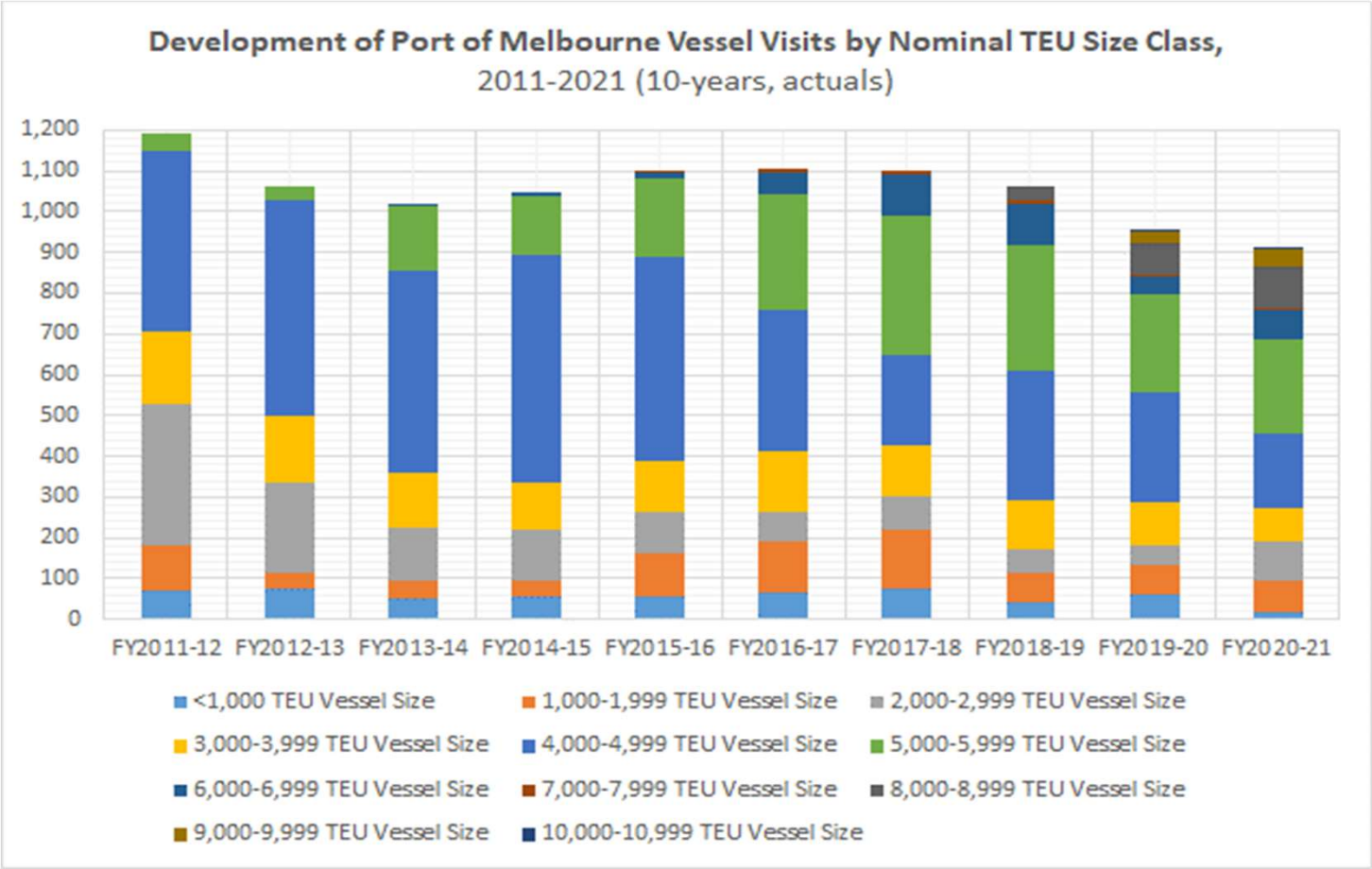
1. Confirming Continuing Calling of Large 8,000+TEU Vessels pushing Swanson access
2. Confirming Continuing Ageing of Melbourne-calling Fleet due to size-mix used
3. Increased Number of Services with minor carrier entrants (BAL, TSL, & Zim) on Asia and NZ trade routes leading to market share fragmentation and average vessel TEU size back at 2018 level. This development may dampen vessel size upsizing on Asian trade if demand growth flat / reducing.

Source: GHD analyses of Clarksons ship database (2015-2022), PoM visit data & carrier published sailing schedules (2015-2022).

Developments in the Melbourne-Calling Containership Fleet

3.3 Historic development of Port of Melbourne international containership visits

Figure 1



Source: GHD analysis of PoM actual vessel visits data, 2011-2021.

Observations of the last 10-years and implications for modelling assumptions:

1. Total vessel visits have fluctuated from **a high of almost 1,200 in FY2011-12 to a low of around 900 in FY2020-21**. Fluctuations caused by new market entrants, splitting of some services, trade downturns / supply-chain issues (the recent COVID-19 situation with reduced visits), and the consolidation of carriers and services
2. There is an apparent general trend of a decline in or flattening of total vessel visits due to use of larger vessels
3. **In FY2011-12, 97% of visits were vessels under 5,000 TEU. Now this is under 60% of vessels visits**

Modelling Assumptions used for Estimating Future Fleet Visits

4.1 Container Trade Demand

Growth in container trade demand is assumed to be the key driver of supplied containership capacity. The supply of containership capacity is provided on a shipping route basis by vessels deployed on scheduled (typically fixed-day, weekly) multi-port direct calling services such that overall indicative Port of Melbourne container trade demand is assessed for each of the main shipping routes and services grouped by TEU size classes.

These main shipping routes, with indicative container trade demand, comprise Asia (North/East & SouthEast), North America (East & West Coast), Europe (via Panama Canal and Suez Canal), and NZ and Pacific Islands (NZ only, Pacific Islands/PNG). In general, the Port of Melbourne direct calling services involve connections with one trade region such that the growth for that trade region is relevant. In the case of the Europe via Suez services, the Australian route is typically an extension of the larger Europe – Middle East trade with the vessels sized for this latter trade region.

The indicative full container demand for each of the shipping routes is divided into two directions - exports and imports, with the head-haul full direction determining the required level of deployed shipping capacity on the respective route and service.

Overall indicative container trade demand forecast, as provided by the PoM (BISOE data, dated 17/11/2022), is used in the modelling. The head-haul growth rates for shipping routes and services are assumed to be 2-4.5% N&E Asia, 2.5-4.8% SE Asia, 2-3.9% Europe/M.East, and flat to <1% for other shipping routes (i.e. North America, NZ, and Pacific Islands/PNG).

4.2 Scale Economies of Ship Size, Access Impacts, and the Splitting of services

The economics of operating containerships generally dictates that, without any other constraints, it is more cost-effective on a Per TEU slot basis to increase the ship size to respond to trade growth than to increase the number of vessel visits (i.e. deploy more vessels) when a fixed-day weekly service level exists. This is the primary demand-side assumption in determining the future size of containerships deployed on shipping routes.

The exception is on routes/services where non-weekly service levels exist of vessel visits every 8-10, 14 or 30 days in which case it is assumed that the first goal is to move towards fixed-day fortnightly then weekly service levels with increased ship size thereafter.

Furthermore, there are situations where more ports of call are added to a service by shipping lines and the port range widens with increased roundtrip times. The shipper requirement for express transit times forces the service to be split into two (or more) services which, for a given level of demand, results in the deployment of smaller vessels. An example of this over the last 10 years is the North/East Asia shipping route which now has multiple services covering the port range.

Modelling Assumptions used for Estimating Future Fleet Visits

4.3 Containership Supply and assumed access constraints

If ongoing access constraints occur (i.e. canals, channels, swing basins, berths etc. at ports on the shipping route) and the maximum ship size is reached on the shipping route, then it is assumed that trade is not lost, but that shipping lines respond to the growth in demand by increasing the number of vessel visits of a maximum (constrained) ship size. As a starting position (the baseline year), the modelling assumes that services will remain at their current respective Port of Melbourne dock precinct until a constraint is hit.

Route specific access constraints are assumed relating to the Port of Melbourne (i.e. Heads and channels of max. 14,000 TEU), the Panama Canal (max. 13,000 TEU), and NZ/Pacific Islands ports (max. 5,000 TEU). At the Port of Melbourne berths, **a general large ship maximum of 10,000 TEU at Swanson Dock** is assumed for the modelling (vessels larger than 10,000 TEU start to become constrained by the Westgate Bridge (WGB) vessel air-draught maximum of 50.1m when vessels are operating at normal operating draughts on Asia trades and have fixed masts). **A general large ship maximum of 14,000 TEU is assumed at Webb Dock** (i.e. Heads constrained as the ultimate constraint) for the modelling. These Swanson Dock and Webb Dock general maximums were provided by PoM.

Research of the existing global containership fleet and targeted discussions with some shipping lines has shown that there are theoretically three vessels of LOA 314m x Beam 48m with 11,568 TEU (nominal) which could access Swanson Dock under current rules, however a minimum of five vessels would be needed to run a weekly Asia service. Some vessels of LOA 330m x Beam 48m with a collapsible mast and a size of around 11,000 TEU (nominal) could theoretically pass under the WGB, but would likely need to ballast down compared with their current operating draughts on the Asia trades.

Table 10 Maximum Containership Size to pass under WGB (at 50.1m limit) and fit Swanson Dock (re. targeted discussions with shipping lines)

Dimensions - LOA x Beam x Max. Summer Draught (m) x Depth (m)	Keel to Mast Height, incl. mast collapsed (m)	Operator	Average Nominal TEU Size	Air draught at 12.0 m loaded draught	Air draught at 14.0 m loaded draught	Able to pass WGB at 12.0m loaded draught	Able to pass WGB at 14.0m loaded draught	Min. loaded draught (m) to pass under WGB
300 x 48 x 14.8 x 24.6	62.0	Existing Lines calling PoM	9,464	50.0	48.0	YES	YES	11.9
314 x 48 x 13.6/14.5 x 24.8 (no collapsible mast)	62.5	Global line (only 3 vessels globally)	11,568	50.5	48.5	NO	YES	12.4
330* x 48 x 16.0 x 27.2	62.2	Global line	11,037	50.2	48.2	NO	YES	12.1
334* x 48 x 16.0 x 26.8	65.0	Asian line 1	11,714	53.0	51.0	NO	NO	14.9
334* x 48 x 15.5 x 26.8	64.9	Asian line 2	11,888	52.9	50.9	NO	NO	14.8

Note: (*) Not currently permitted to access Swanson Dock but subject to current simulation exercise of LOA 330-334m x 48m Beam vessel size by harbour master.

Modelling Assumptions used for Estimating Future Fleet Visits

4.4 Containership Supply from the global fleet

In the past (2017-2021), there had been a continued ageing and lack of re-ordering of the 6,000 to 8,000 TEU size class. In previous fleet forecasts, it had been assumed that by 2026 no 6,000 to 8,000 TEU vessels will be deployed on Australian routes with vessels jumping from 2026 and onwards from 6,000 TEU straight to 8,000+ TEU size as trade grows. However, the July 2022 detailed analysis of the global fleet (see section 2.4 above) has shown that this gap in the 6,000 to 8,000 TEU size class has been reversed with significant ordering of new vessels of around 7,000 TEU. Consequently, the 2022-2050 fleet forecasts assume that all vessel size classes in the global fleet are available to Melbourne services.

There is often discussion in the shipping industry of 'cascading' large vessels from major (East-West) trades-lanes to minor (North-South) trade-lanes. However, it is assumed in the modelling that these cascaded vessels will still need to be operated profitably which requires adequate utilisations (i.e. available capacity still needs to be matched to available demand). It is also assumed that the required sizes of vessels are equally available to all lines and services – this may vary in reality as some lines are more global or regional in their focus with differing fleet profiles and/or differing shares of owned versus chartered-in vessels.

4.5 COVID-19 Pandemic and Global Supply-Chain impacts on vessel visits

Analysis of actual versus scheduled annual vessel visits to the Port of Melbourne in CY2021 has shown that carriers have not met their scheduled number of visits per year with around 82% of scheduled visits actually occurring (excl. extra vessel loaders). **Typical levels of service delivery are 95-98% (i.e. before recent global supply chain and port congestion issues).** It is assumed that shipping markets will normalize again taking several years for service delivery to reach an assumed **100% for planning purposes** (see section 4.8 below on the assumptions used in the modelling). For instance, **in FY2020-21 (the height of supply-chain issues and cancelled sailings), Port of Melbourne total international containership visits were 914, whereas in FY2018-19 (pre-COVID) total visits were 1,064** (see section 3.3 for a 10-year history of actual vessel visit numbers).

Modelling Assumptions used for Estimating Future Fleet Visits

4.6 Vessel Voyage Utilisations and Seasonality

The modelling assumes that vessels on all services operate at an **average maximum utilization of 85% of nominal TEU capacity on head-haul voyages** which is set at this level to take account of seasonality (peak season) demand. This vessel utilization accounts for all Australian port calls such that Port of Melbourne containers represent a share of the capacity used (this relative share between other Australian ports is assumed fixed). **The Port of Melbourne share of available vessel space is generally set an assumed 35%** for a typical East-coast main-port rotation of Melbourne / Sydney / Brisbane. Lower shares are assumed for services with more Australian port calls.

If a vessel service is calculated as having a Port of Melbourne head-haul demand growth in excess of the maximum Port of Melbourne vessel space-share then a larger vessel is assumed to deployed to match the demand growth. Otherwise the demand growth is assumed to be absorbed by the available unused Port of Melbourne space, i.e. the vessel size remains constant. Also, if a large vessel is assumed suddenly deployed with surplus capacity (i.e. in the case when vessel size jumps from 6,000 TEU to 8,000 TEU) then this excess capacity is first used up to respond to demand growth before the vessel size is increased again.

4.7 Shipping line and service consolidation impacts (consortia / alliances)

Over the last 10-15 years, shipping lines have sought to achieve further economies of scale (use larger vessels) and reduce costs as well as expand global port coverage by consolidating both companies (takeovers/mergers) and forming consortia/operating alliances. The timings of these industry-lead changes are sporadic and hard to predict. **The IMO decarbonisation 2023 regulations may well be the next driver of these service (vessel string) consolidations resulting in larger vessels deployed on some shipping routes to reduce carbon intensity**.

This service consolidation effect is discussed in section 7.3 (Sensitivity), and as such provides the potential for the Port of Melbourne in the long-term to under-estimate the possible ‘latent’ demand for larger containerships and the speed of their introduction as access is provided.

A reverse trend can also occur in exceptionally favourable market conditions (i.e. the recent COVID-19 years) for carriers whereby smaller (niche) carriers and new entrants decide to establish new services with small vessels matching their relatively small market shares. This has recently occurred in Melbourne and is discussed further in section 4.8 below.

Modelling Assumptions used for Estimating Future Fleet Visits

4.8 Modelling using two future fleet scenarios (A and B)

In order to capture potential differences in how the container shipping market may return to normalised operating conditions after the exceptional 2020-2022 period, two Fleet Scenarios (A and B) have been modelled with the differences between the two summarized in the table below. Some factors which are background to the assumptions used in the Scenarios are: recent abnormally high freight and charter rates/profits for carriers sustaining opportunistic small vessel operations; supply-demand expected to rebalance in the next two years with vessels on order being delivered and the demolition of older vessels recommencing as greenhouse gas (GHG) abatement measures accelerate the need for more efficient / alternative-fuelled vessels; and the current overseas port congestion stabilizing / reducing as supply-demand balances.

Table 11 Overview of Modelled Scenarios A and B

Modelling Assumptions used for Fleet Forecasts (differences between scenarios)	Scenario A	Scenario B
1. Container Demand	PoM Forecast	Same as for A
2. Normalisation of Service Delivery as Supply-Chains recover, % of Scheduled visits performed	100% by 2025 (85% in 2023, 95% in 2024)	100% by 2026 (78% in 2023, 82.5% in 2024, 90% in 2025)
3. Recent Opportunistic Small Vessel Services	3 Cease by 2023 (of which 2 merged with existing larger vessel services)	All remain with market share taken from larger vessel services
4. Vessel Services transferring between PoM Dock Precincts	Swanson Dock vessels generally transfer to Webb Dock when reach 10,000 TEU size; one service assumed to remain by splitting into 2x weekly strings; small vessel size services and one normal-sized Asia service at Webb Dock assumed to transfer to Swanson Dock if capacity shortfall at Webb Dock / surplus capacity at Swanson Dock	Swanson Dock vessels generally transfer to Webb Dock when reach 10,000 TEU size; small vessel size services and one normal-sized Asia service at Webb Dock assumed to transfer to Swanson Dock if capacity shortfall at Webb Dock / surplus capacity at Swanson Dock

Modelling – Services Analysed

4.9 Modelled International Containership Services

Table 12 Port of Melbourne Container Services Overview (Projected 2Q 2022)

Service #	Region(s) Serviced	Scheduled Frequency (days)	PoM Dock Precinct	Number Vessels	Average TEU Size (CY2021)	Min. TEU Size (CY2021)	Max. TEU Size (CY2021)	Average Max. Air Draught, m (CY2021)
1	SE Asia	7.0	ESD	5	4,348	4,250	4,578	45.7
2	SE Asia	7.0	ESD	5	5,143	4,250	5,888	47.7
3	N&E Asia	7.0	WSD	5	5,676	4,253	5,782	47.3
4	N&E Asia	7.0	ESD	5	4,001	2,810	5,060	45.1
5	N&E Asia	7.0	WSD	5	5,730	5,618	5,888	48.1
6	N&E Asia	7.0	VICT	5	5,585	5,023	6,350	47.9
7	N&E Asia	7.0	WSD	6	5,545	5,047	6,039	47.0
8	SE Asia	7.0	VICT	6	8,683	4,250	10,622	52.1
9	SE Asia	7.0	WSD	6	6,015	5,600	6,921	48.3
10	N&E Asia	7.0	ESD	7	6,649	5,301	8,450	46.7
11	N&E Asia	7.0	VICT	5	8,542	8,063	8,888	51.2
12	SE Asia/NZ	7.0	ESD	6	3,370	2,526	5,060	46.1
13	SE Asia	7.0	VICT	7	4,447	4,250	6,921	47.6
14	N&E Asia	7.0	ESD	6	2,909	2,732	4,253	44.3
15	SE Asia	7.0	ESD	7	2,612	1,809	2,824	44.6
16	NAm.-EC	7.0	ESD	11	3,365	3,028	3,630	46.4
17	NAm.-WC	7.0	WSD	9	4,229	3,765	4,870	46.0
18	Europe-Panama	10.0	WSD	7	2,348	2,200	2,556	45.7
19a	Europe-Suez	7.0	ESD	10	8,555	6,572	9,580	47.5
19b	Europe-Suez		VICT	4	8,977	6,350	9,326	53.5
20	NZ only	7.0	WSD	3	1,756	1,740	2,226	40.3
21	Pac.Isl./PNG	20.0	ESD	1	981	981	981	37.4
22	Pac.Isl./PNG	21.0	ESD	2	1,461	1,304	1,617	39.8

WGB limit = 50.1m

Note: WGB is Westgate Bridge

Modelling – Services Analysed

4.9 Modelled International Containership Services

Table 12 (cont.) Port of Melbourne Container Services Overview (Projected 2Q 2022) - continued

Service #	Region(s) Serviced	Scheduled Frequency (days)	PoM Dock Precinct	Number Vessels	Average TEU Size (CY2021)	Min. TEU Size (CY2021)	Max. TEU Size (CY2021)	WGB limit = 50.1m Average Max. Air Draught, m (CY2021)
23-New	N&E Asia	12.0	VICT	3	4,679	4,395	4,963	49.6
24-New	N&E Asia	7.0	ESD	5	2,506	1,740	4,363	42.4
25-New	N&E Asia	7.0	WSD	6	4,478	4,211	4,992	-
26-New	N&E Asia	7.0	VICT	6	1,756	1,708	1,800	-
27-New	NZ only	7.0	VICT	2	1,102	1,102	1,102	38.9
28-New	NZ only	21.0	VICT	1	1,118	1,118	1,118	-
Extra1-SD	All	-	SD	11	3,992	2,546	8,533	45.4
Extra2-WD	All	-	VICT	3	5,003	2,546	9,640	48.9
All	**All**	-	**SD**	**128**	**4,421**	**981**	**9,580**	-
All	**All**	-	**VICT**	**42**	**5,540**	**1,102**	**10,622**	-
All	**All**	-	**PoM**	**170**	**4,697**	**981**	**10,622**	-

Note 1: Services #25, 26 & 28 are only planned to commence in 1Q or 2Q 2022, so vessel sizes are not actuals for CY2021 but are estimates based as public announcements by carriers.

Note 2: Total numbers of vessels for modelling purposes include visits by non-scheduled extra loaders (Extra 1-SD & Extra 2-WD). Scheduled fleet projected for 2Q2022 is 156 vessels.

Modelling – Services Analysed

4.10 Reference Containership Size Class Dimensions

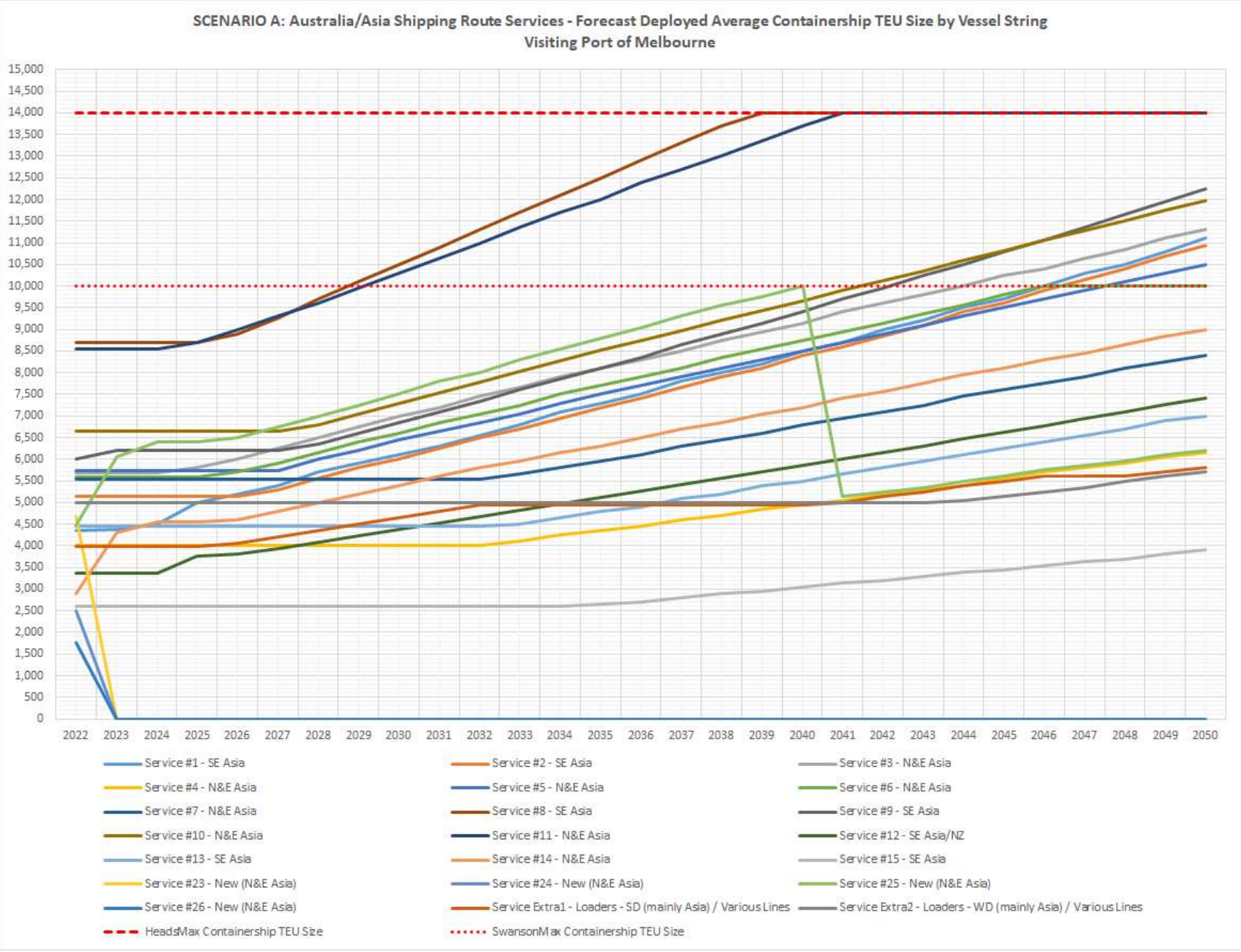
Table 13 Reference Container Vessel Size Class Dimensions

Reference Container Vessel Size Class Dimensions	PoM Dock	Dimensions - LOA x Beam (m)	Vessel Name (& Operator)	TEU	Year of Build	PoM Routes (2022)
<1,000 TEU	SD+WD	L 158 x B 22	Kokopo Chief (Swire)	981	1991	Pac./PNG
1,000-1,999 TEU	SD+WD	L 176 x B 27	Hansa Freyburg (ANL)	1,740	2003	NZ only
2,000-2,999 TEU	SD+WD	L 225 x B 30 / L 217 x B 32	Porto (Zim)	2,790	2010	Eur.(PC)/Asia
3,000-3,999 TEU	SD+WD	L 254 x B 32	Spirit of Singapore (HSud)	3,630	2007	N. America
4,000-4,999 TEU	SD+WD	L 294 x B 32 / L 255 x B 37	Hyundai Integral (HMM)	4,728	2008	Asia
5,000-5,999 TEU	SD+WD	L 277-281 x B 40	CMA CGM Chopin (CMA)	5,782	2004	Asia
6,000-6,999 TEU	SD+WD	L 304-306 x B 40	Al Rawdah (HL)	6,921	2008	Asia
7,000-7,999 TEU	SD+WD	L 300-323 x B 43	Santa Catarina (Maersk)	7,154	2011	Asia
8,000-8,999 TEU	SD+WD	L 335 x B 43 / L 300 x B 48	OOCL Miami (OOCL)	8,888	2013	Asia
9,000-9,999 TEU	SD+WD	L 328-337 x B 45-46 / L 300 x B 48	MSC Susanna (MSC)	9,178	2005	Eur.(Sz)/Asia
10,000-10,999 TEU	(SD)+WD	L 300 x B 48	CMA CGM Ural (CMA CGM)	10,622	2015	Asia
11,000-11,999 TEU	WD	L 330-334 x B 48	Ever Fame	11,888	2021	-
12,000-12,999 TEU	WD	L 366 x B 48	Rome Express (Hapag-Lloyd)	12,552	2010	-
13,000-13,999 TEU	WD	L 366 x B 51	ONE Manchester (ONE)	13,870	2015	-
14,000-14,999 TEU	WD	L 366-369 x B 51	COSCO Shipping Denali	14,500	2018	-
Note: Named Vessels up to 11,000 TEU have called PoM in the recent past (2021).						

Modelling Results – Scenario A

5.1 Development of Future Containership Sizes – Asia Services

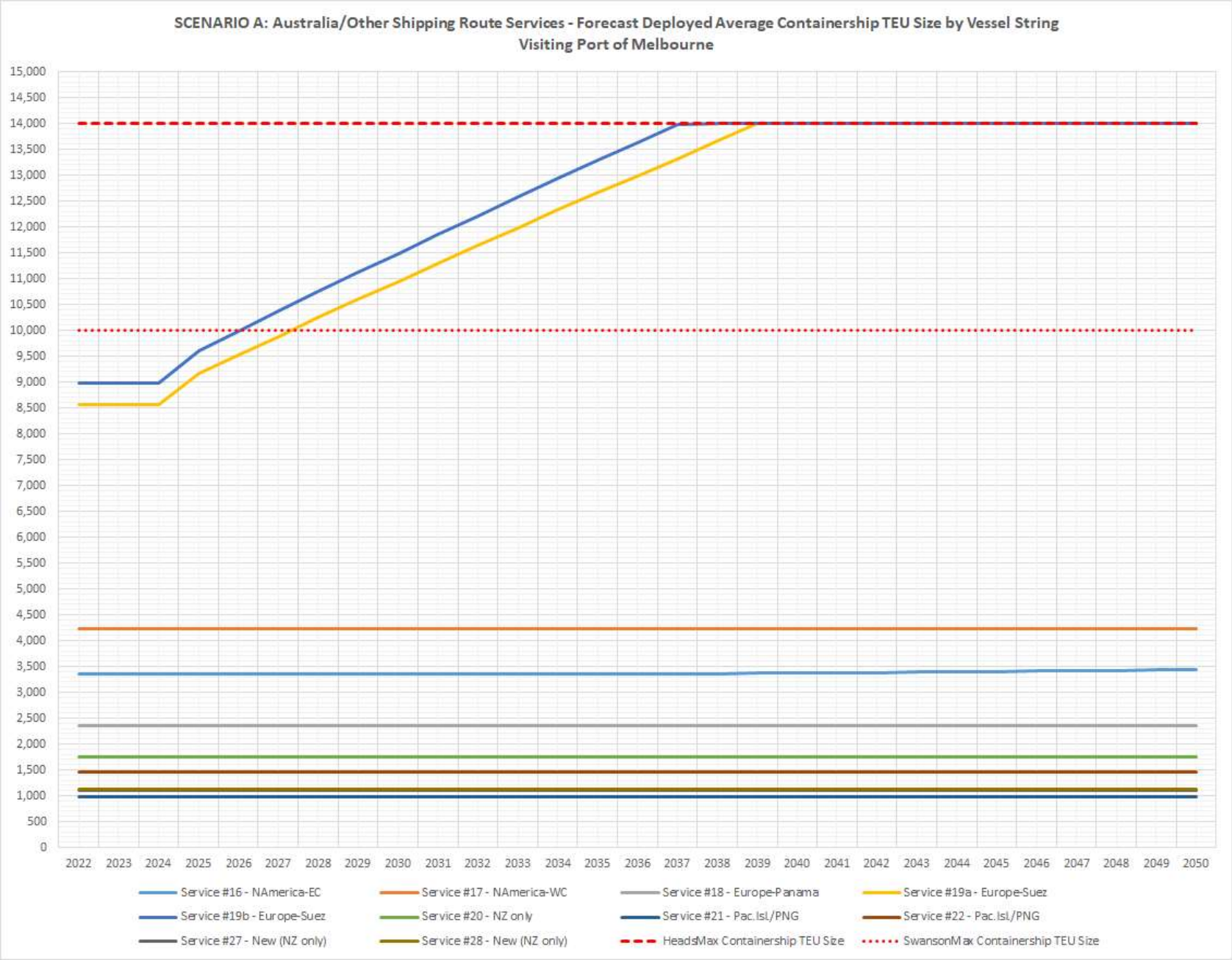
Figure 2



Modelling Results – Scenario A

5.2 Development of Future Containership Sizes – Other (Non-Asia) Services

Figure 3



Modelling Results – Scenario A

5.3 Containership Services at suggested Dock Precinct (2022 to 2030)

Table 14 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2022	2023	2024	2025	2026	2027	2028	2029	2030
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #3 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #6 - N&E Asia	WD	WD	WD	WD	WD	WD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #10 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	WD	0	0	0	0	0	0	0	0
Service #24 - New (N&E Asia)	SD	0	0	0	0	0	0	0	0
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	WD	0	0	0	0	0	0	0	0
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	WD	WD	WD	WD	WD	WD	WD	WD	WD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	SD	SD	SD	SD	SD	SD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #28 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD

Modelling Results – Scenario A

5.4 Containership Services at suggested Dock Precinct (2031 to 2040)

Table 15 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #3 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	WD	WD	WD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #6 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #10 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service #24 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	SD	SD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	WD	WD	SD	SD	SD	SD	SD	SD	SD	SD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	SD	SD
Service #28 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	SD	SD

Modelling Results – Scenario A

5.4 Containership Services at suggested Dock Precinct (2041 to 2050)

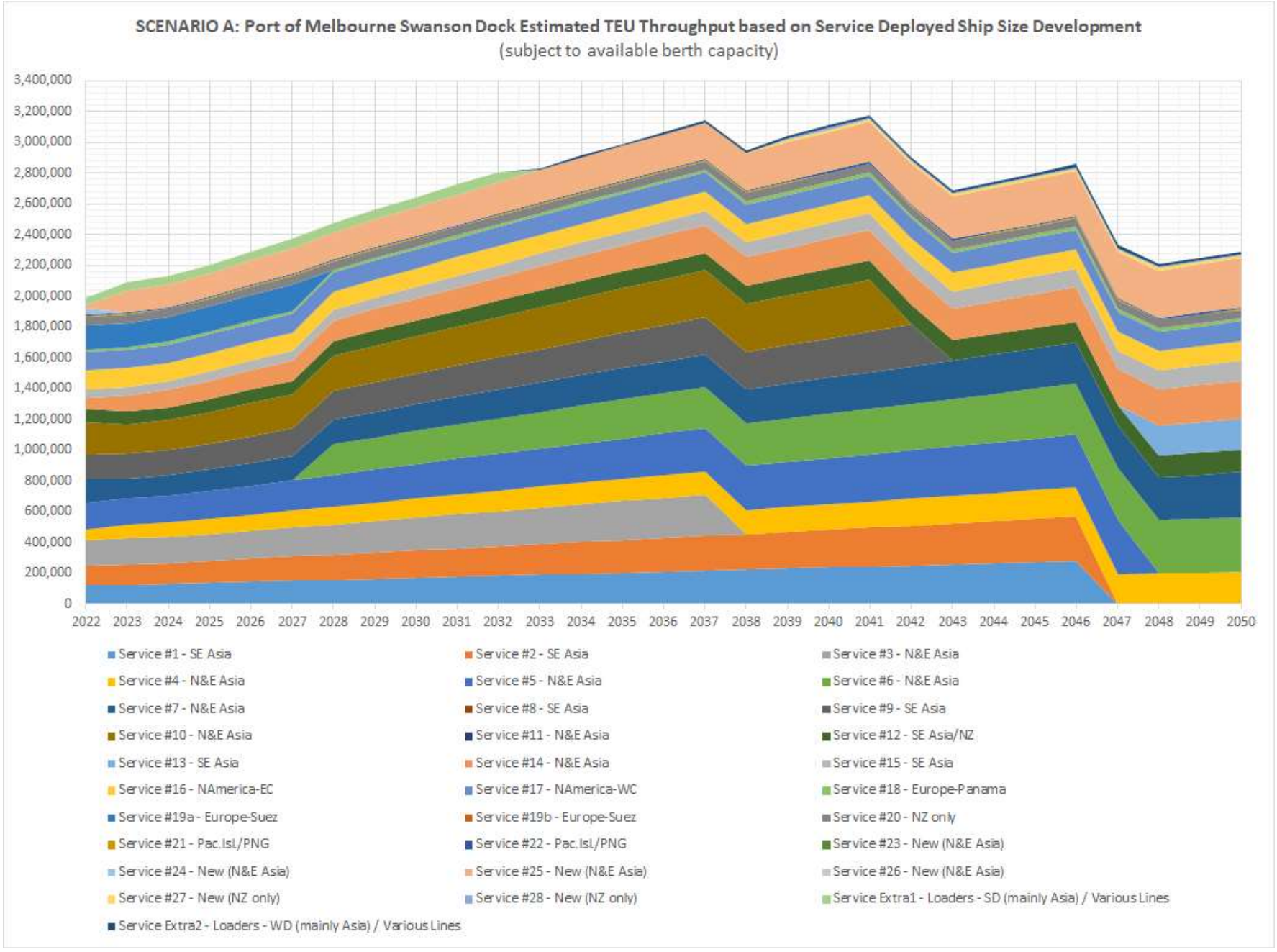
Table 16 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	WD	WD	WD	WD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	WD	WD	WD	WD
Service #3 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	WD	WD	WD
Service #6 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	WD	WD	WD	WD	WD	WD	WD	WD
Service #10 - N&E Asia	SD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	SD	SD	SD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service #24 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	0	0	0	0	0	0	0	0	0	0
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #28 - New (NZ only)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD

Modelling Results – Scenario A

5.5 Swanson Dock Est. Future Throughput with max. 10,000 TEU access

Figure 4

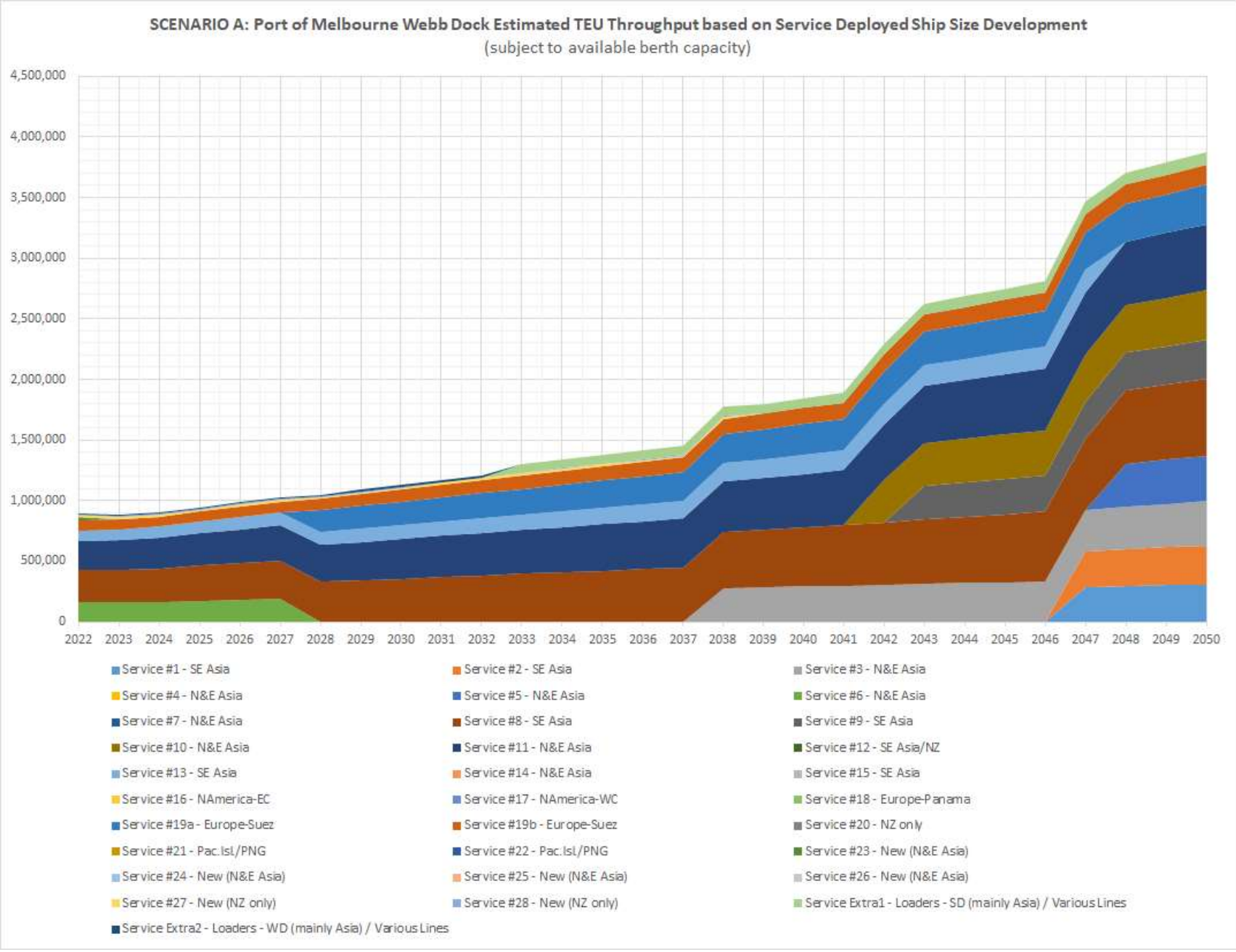


GHD Advisory

Modelling Results – Scenario A

5.6 Webb Dock Est. Future Throughput with max. 14,000 TEU access

Figure 5

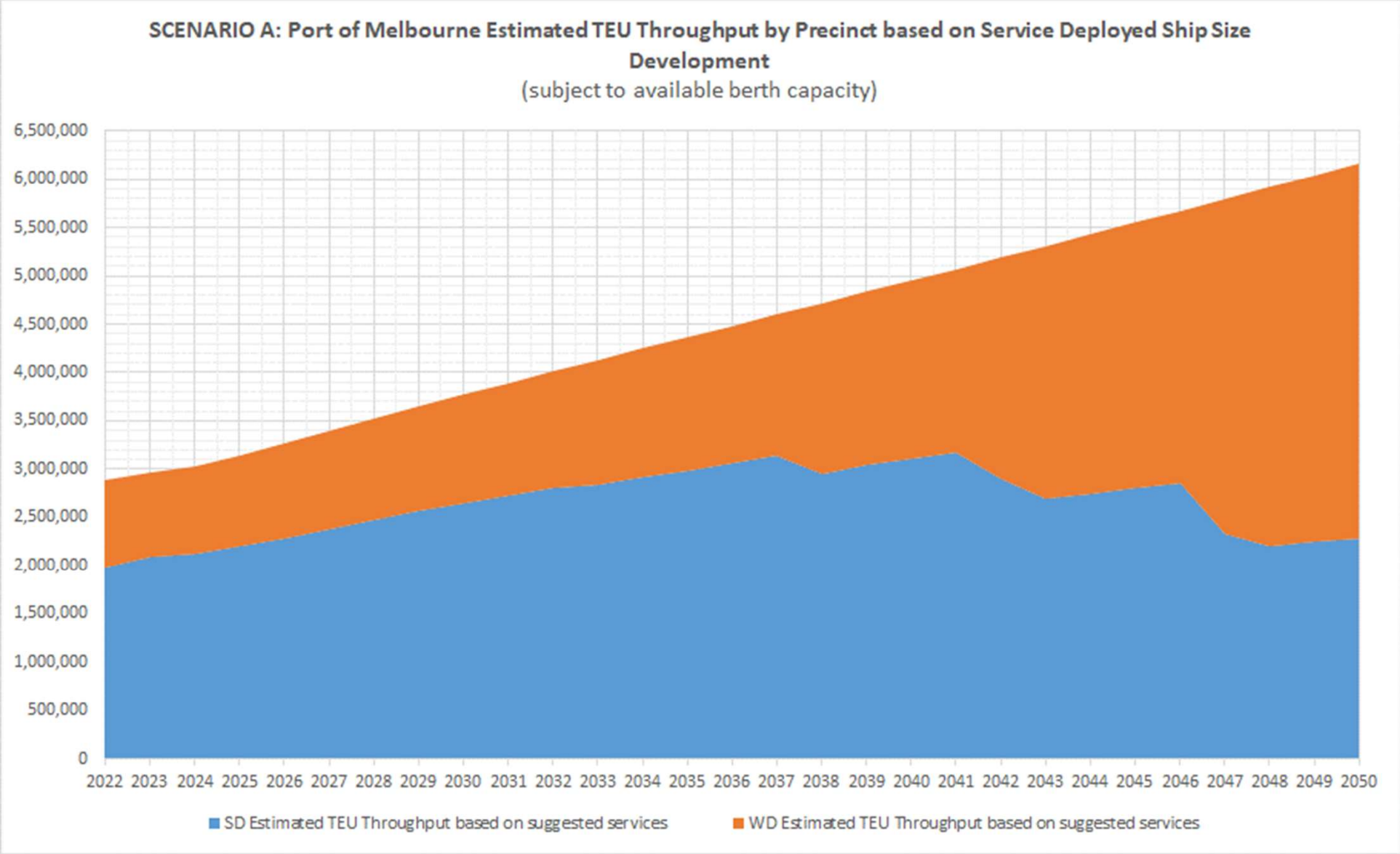


GHD Advisory

Modelling Results – Scenario A

5.7 Port of Melbourne Throughput by Precinct given ship size development

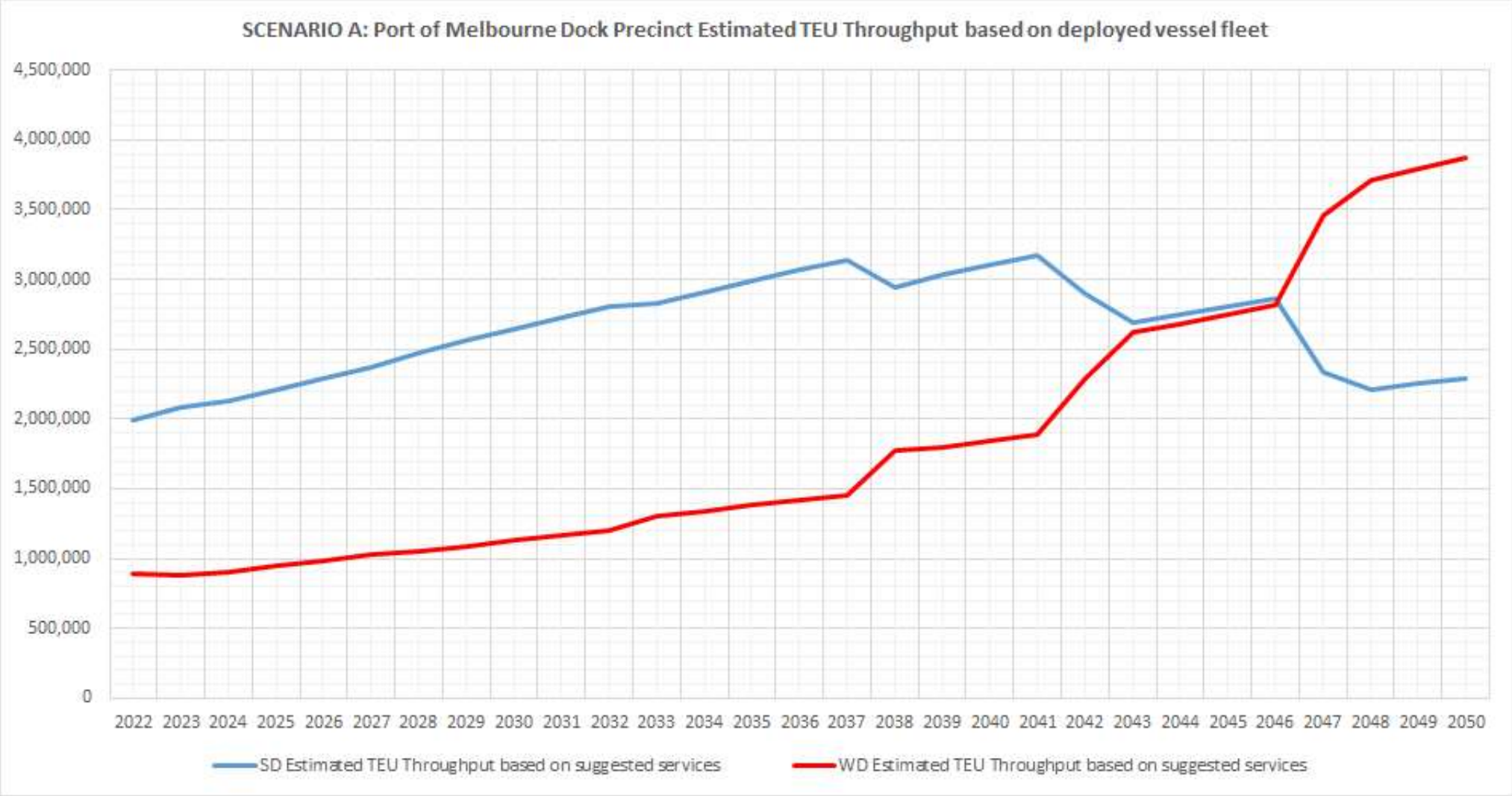
Figure 6



Modelling Results – Scenario A

5.8 Port of Melbourne – Estimated Throughput by Precinct

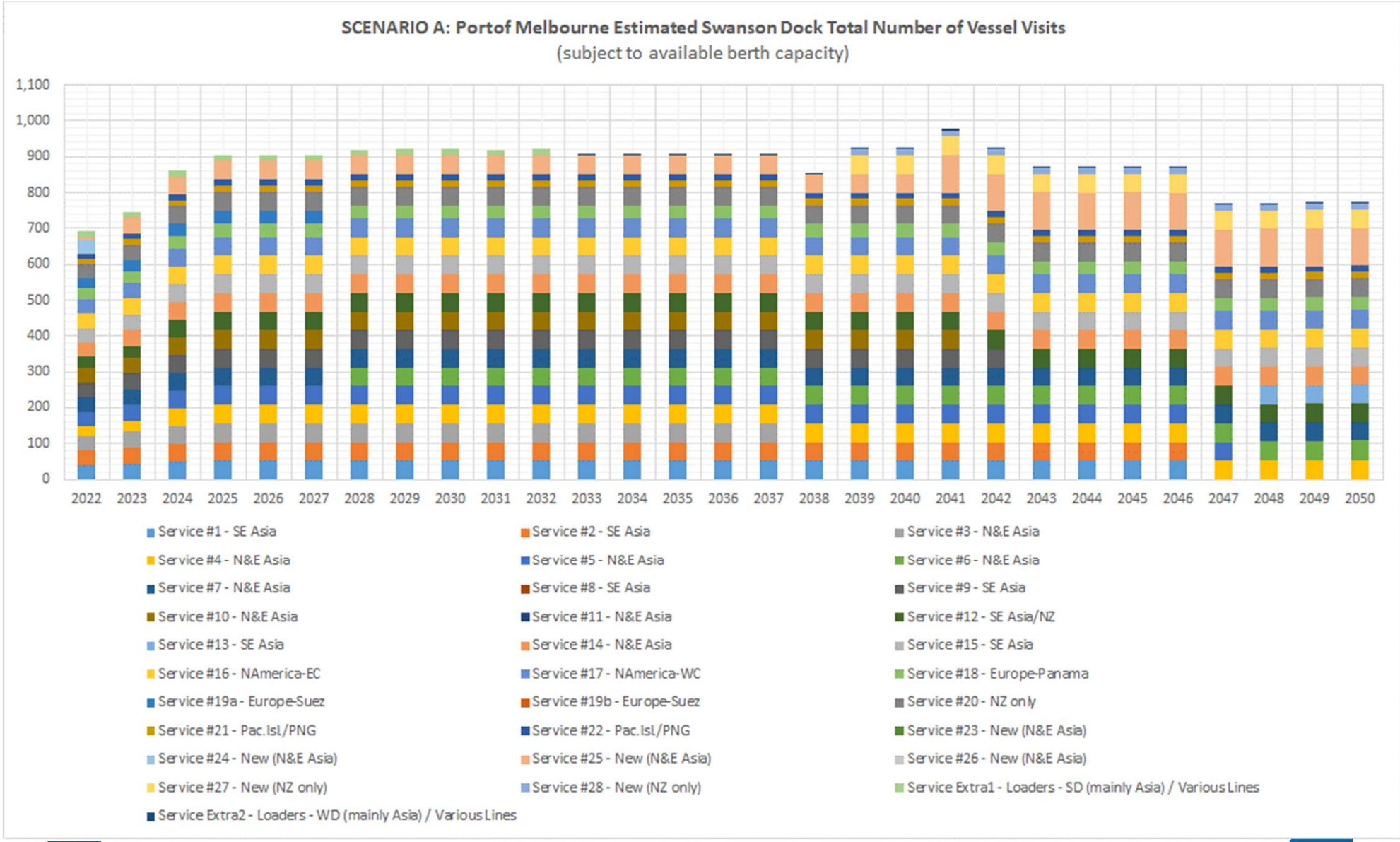
Figure 7



Modelling Results – Scenario A

5.9 Estimated Number of Future Vessel Visits by Service – Swanson Dock

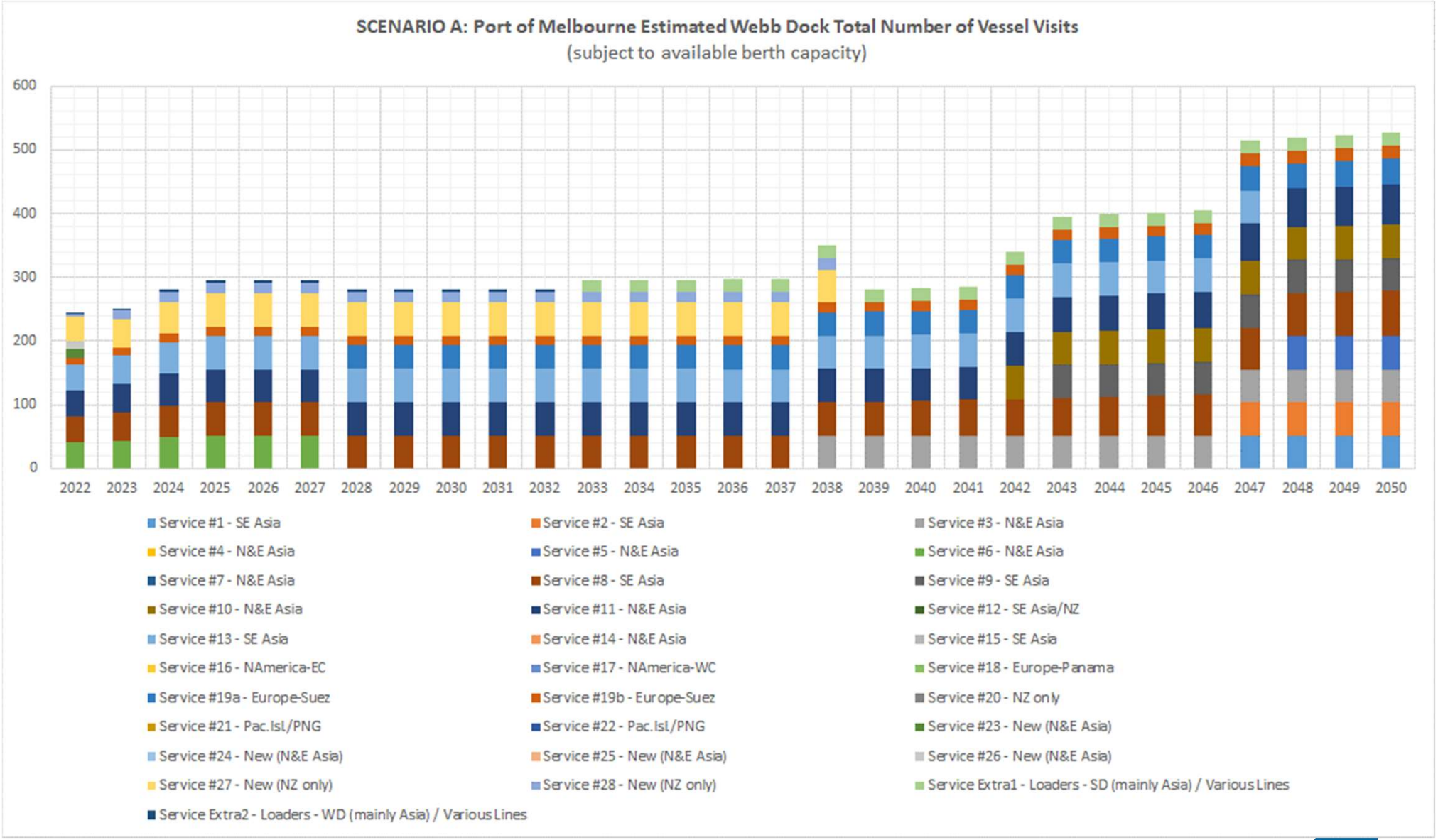
Figure 8



Modelling Results – Scenario A

5.10 Estimated Number of Future Vessel Visits by Service – Webb Dock

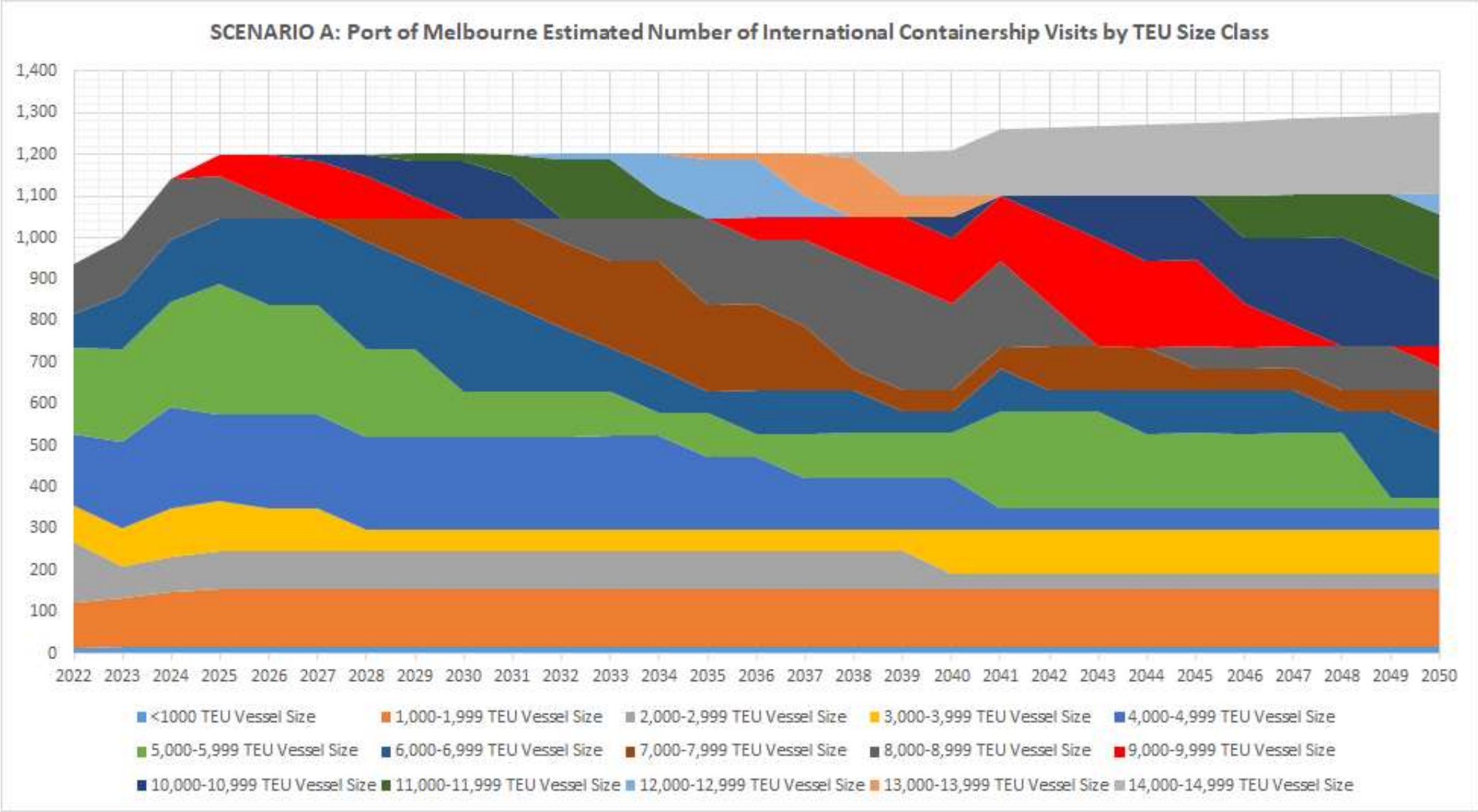
Figure 9



Modelling Results – Scenario A

5.11 Port of Melbourne Future Vessel Visits by Vessel TEU Size Class

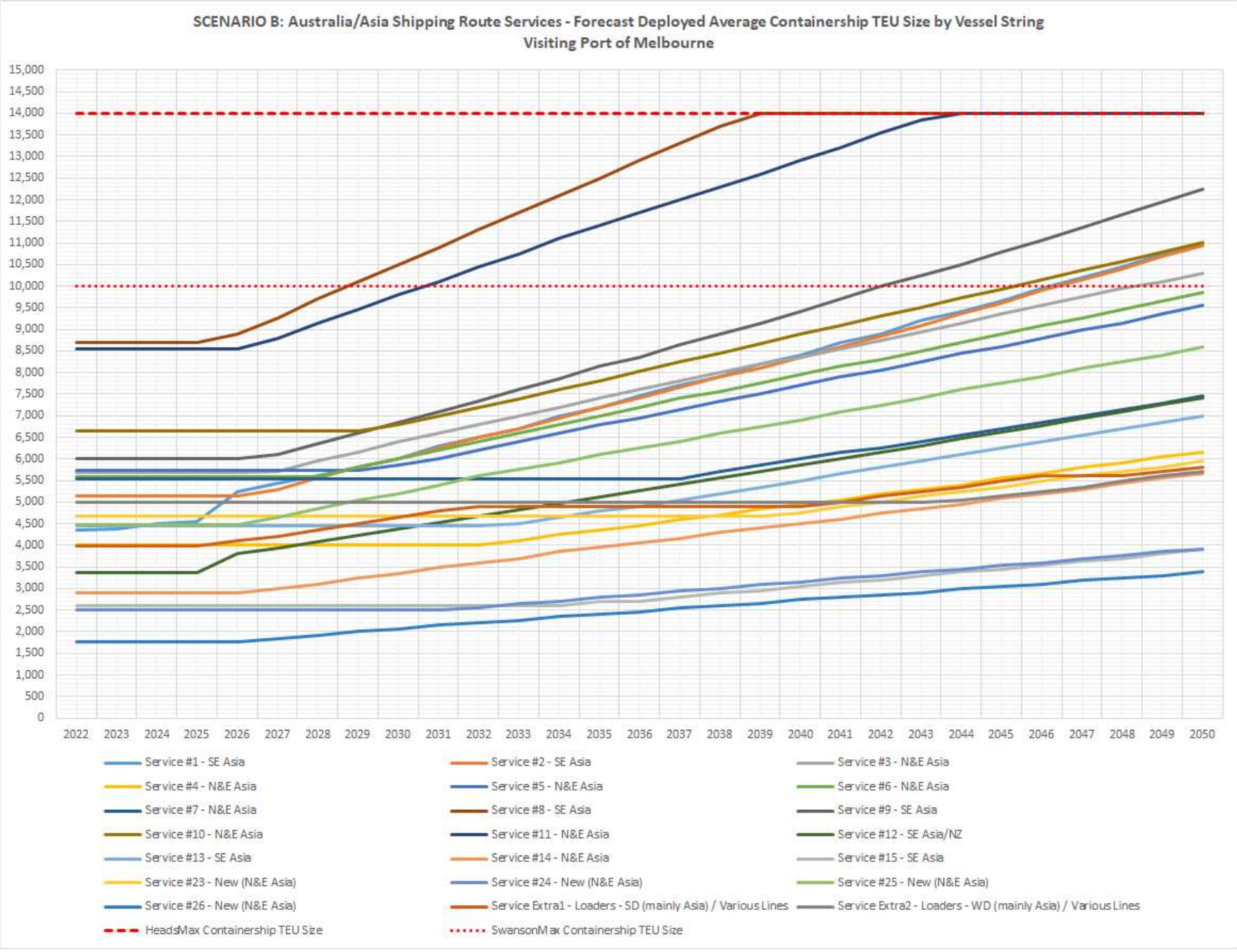
Figure 10



Modelling Results – Scenario B

6.1 Development of Future Containership Sizes – Asia Services

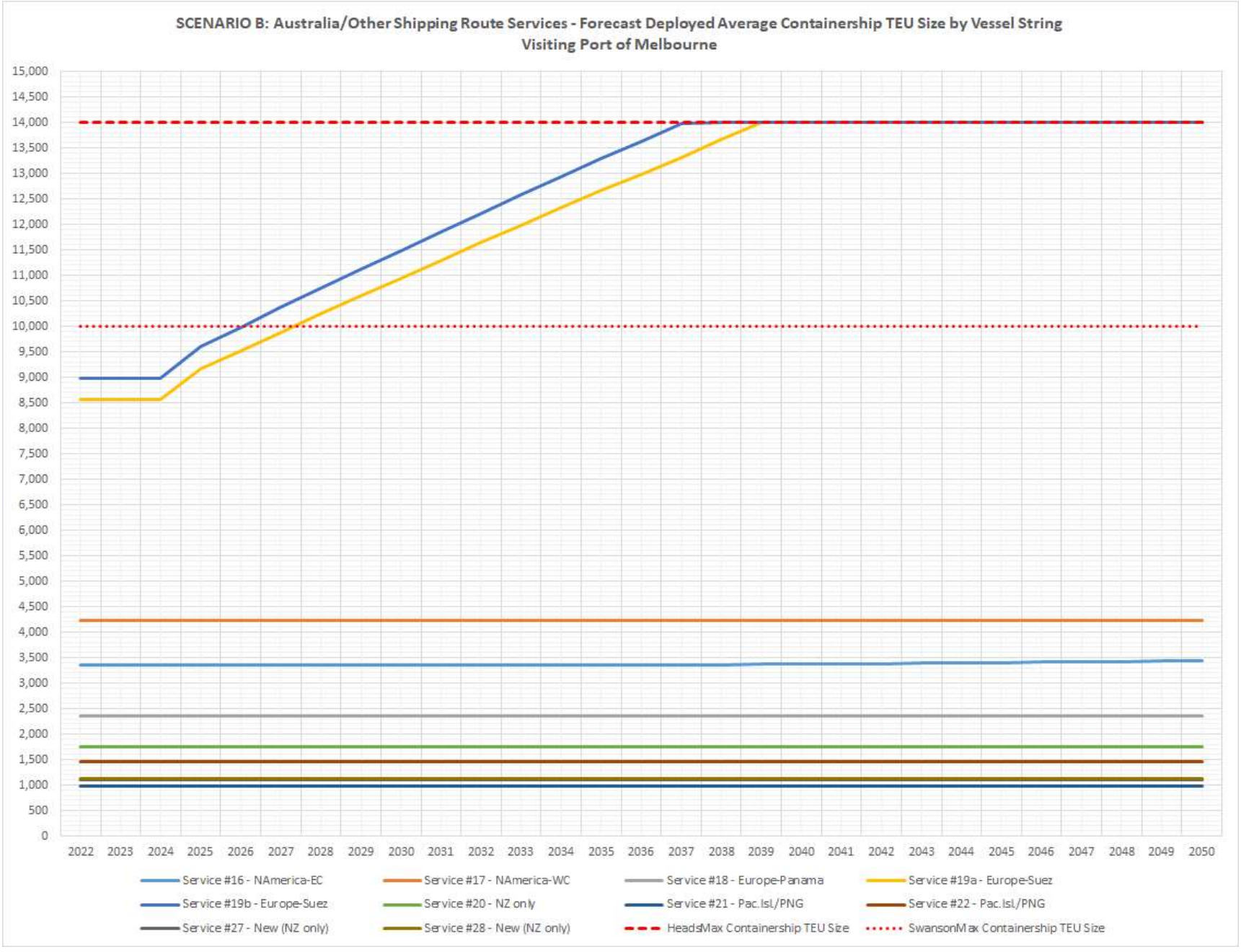
Figure 11



Modelling Results – Scenario B

6.2 Development of Future Containership Sizes – Other (Non-Asia) Services

Figure 12



Modelling Results – Scenario B

6.3 Containership Services at suggested Dock Precinct (2022 to 2030)

Table 17 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2022	2023	2024	2025	2026	2027	2028	2029	2030
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #3 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #6 - N&E Asia	WD	WD	WD	WD	WD	WD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #10 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #24 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	WD	WD	WD	WD	WD	WD	WD	WD	WD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	SD	SD	SD	SD	SD	SD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #28 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD

Modelling Results – Scenario B

6.4 Containership Services at suggested Dock Precinct (2031 to 2040)

Table 18 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #3 - N&E Asia	SD	SD	SD	SD	WD	WD	WD	WD	WD	WD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #6 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #10 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #24 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	SD	SD	SD	SD	WD	WD	WD	WD	WD	WD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	WD	WD	WD	WD	SD	SD	SD	SD	SD	SD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #28 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD

Modelling Results – Scenario B

6.4 Containership Services at suggested Dock Precinct (2041 to 2050)

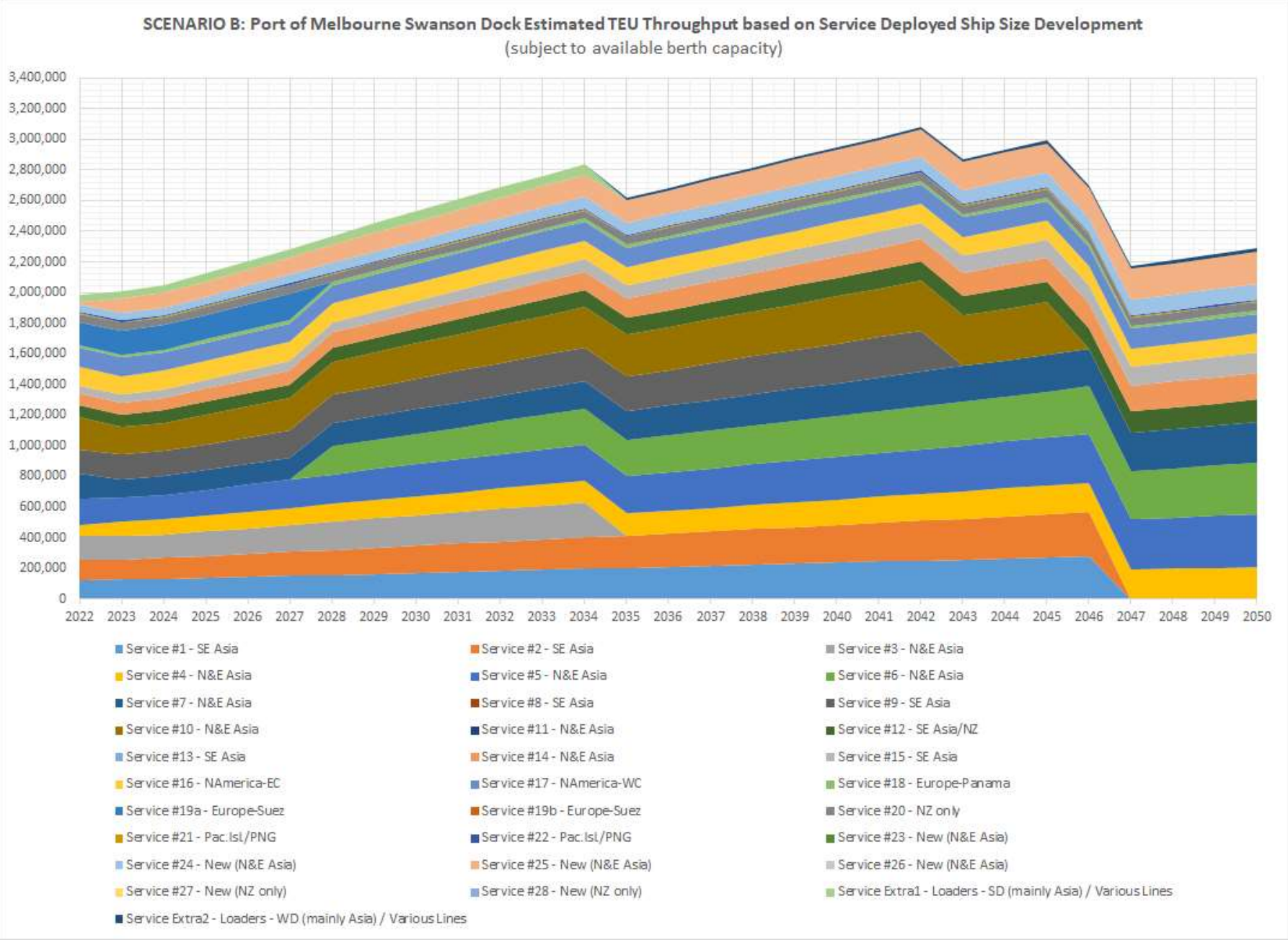
Table 19 Containership Services at Port of Melbourne Dock Precincts based on vessel size access

Asia Services - Suggested Dock subject to Capacity & Berth Utilisations	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Service #1 - SE Asia	SD	SD	SD	SD	SD	SD	WD	WD	WD	WD
Service #2 - SE Asia	SD	SD	SD	SD	SD	SD	WD	WD	WD	WD
Service #3 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #4 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #5 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #6 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #7 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #8 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #9 - SE Asia	SD	SD	WD	WD	WD	WD	WD	WD	WD	WD
Service #10 - N&E Asia	SD	SD	SD	SD	SD	WD	WD	WD	WD	WD
Service #11 - N&E Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #12 - SE Asia/NZ	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #13 - SE Asia	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #14 - N&E Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #15 - SE Asia	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #23 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #24 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #25 - New (N&E Asia)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #26 - New (N&E Asia)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra1 - Loaders - SD (mainly Asia) / Various Lines	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service Extra2 - Loaders - WD (mainly Asia) / Various Lines	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Other Services - Suggested Dock subject to Capacity & Berth Utilisations	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Service #16 - NAmerica-EC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #17 - NAmerica-WC	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #18 - Europe-Panama	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #19a - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #19b - Europe-Suez	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #20 - NZ only	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #21 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #22 - Pac.Isl./PNG	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
Service #27 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD
Service #28 - New (NZ only)	WD	WD	WD	WD	WD	WD	WD	WD	WD	WD

Modelling Results – Scenario B

6.5 Swanson Dock Est. Future Throughput with max. 10,000 TEU access

Figure 13

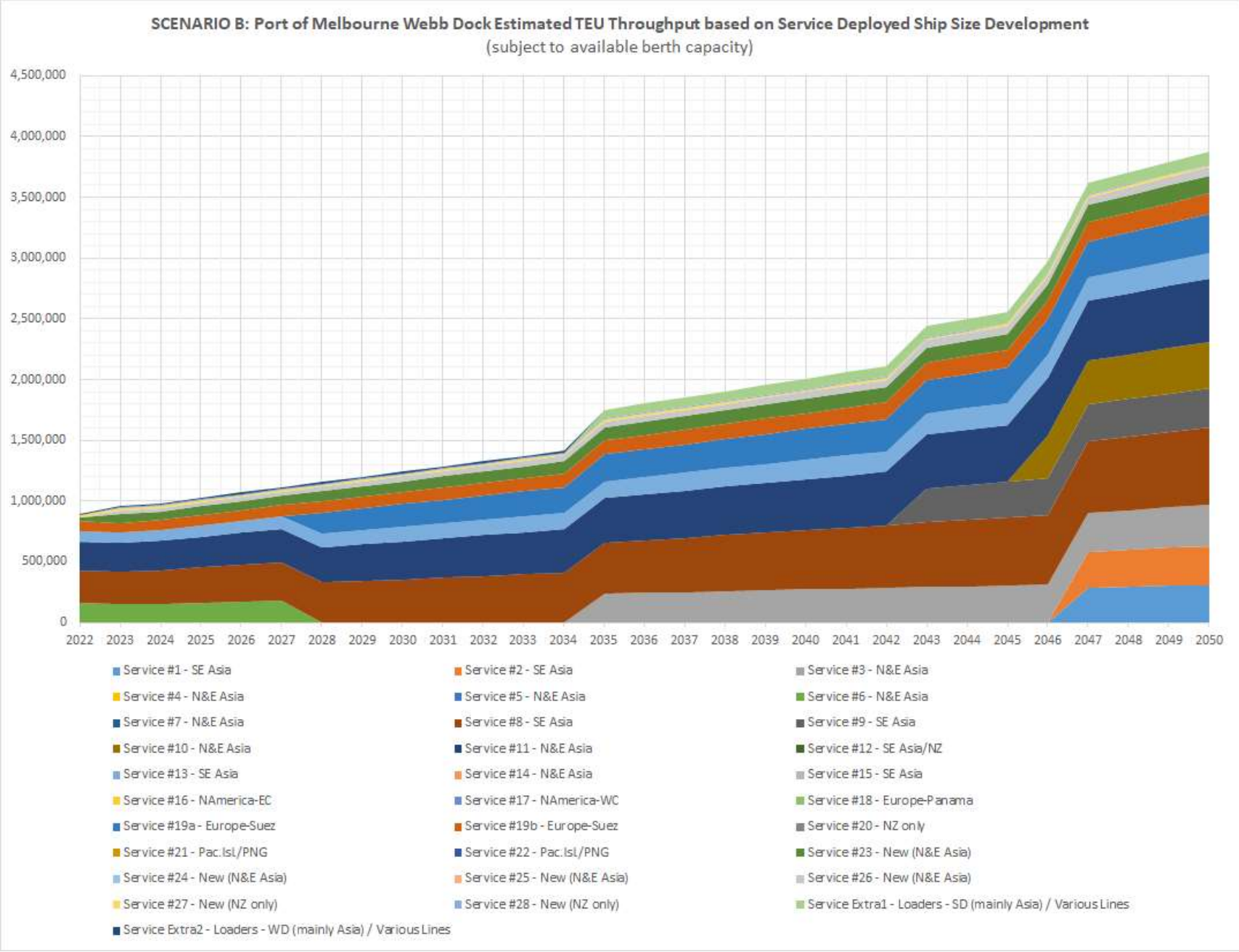


GHD Advisory

Modelling Results – Scenario B

6.6 Webb Dock Est. Future Throughput with max. 14,000 TEU access

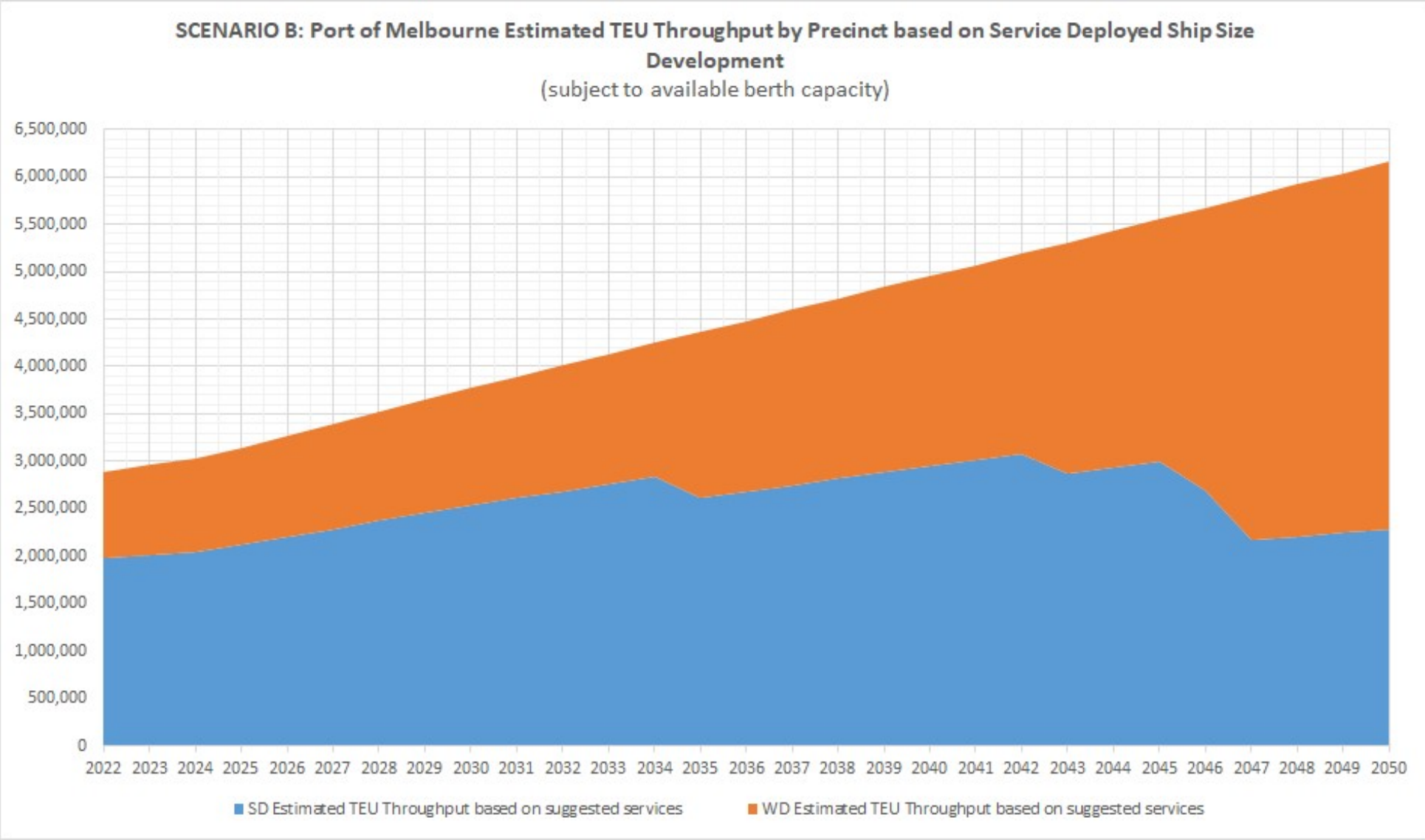
Figure 14



Modelling Results – Scenario B

6.7 Port of Melbourne Throughput by Precinct given ship size development

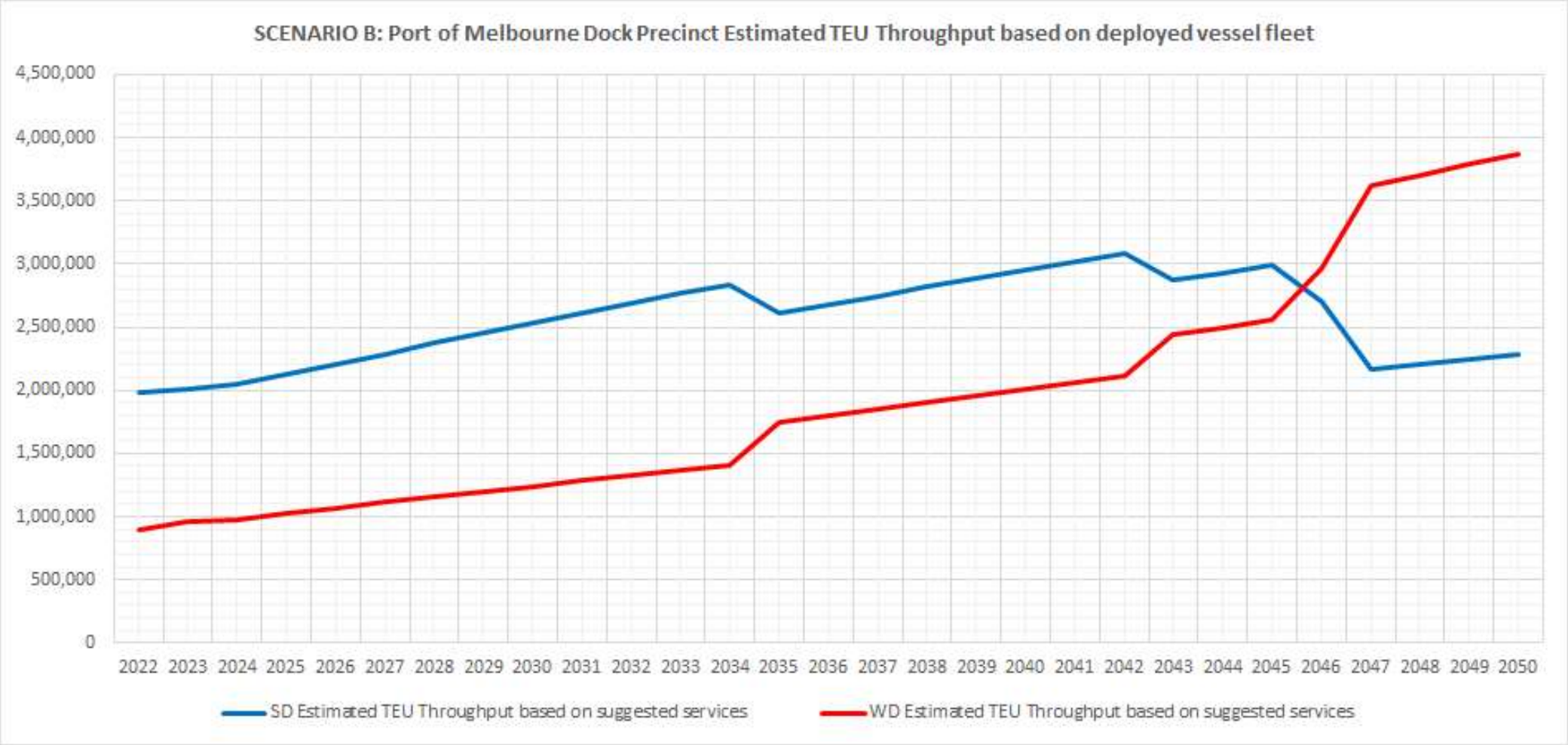
Figure 15



Modelling Results – Scenario B

6.8 Port of Melbourne – Estimated Throughput by Precinct

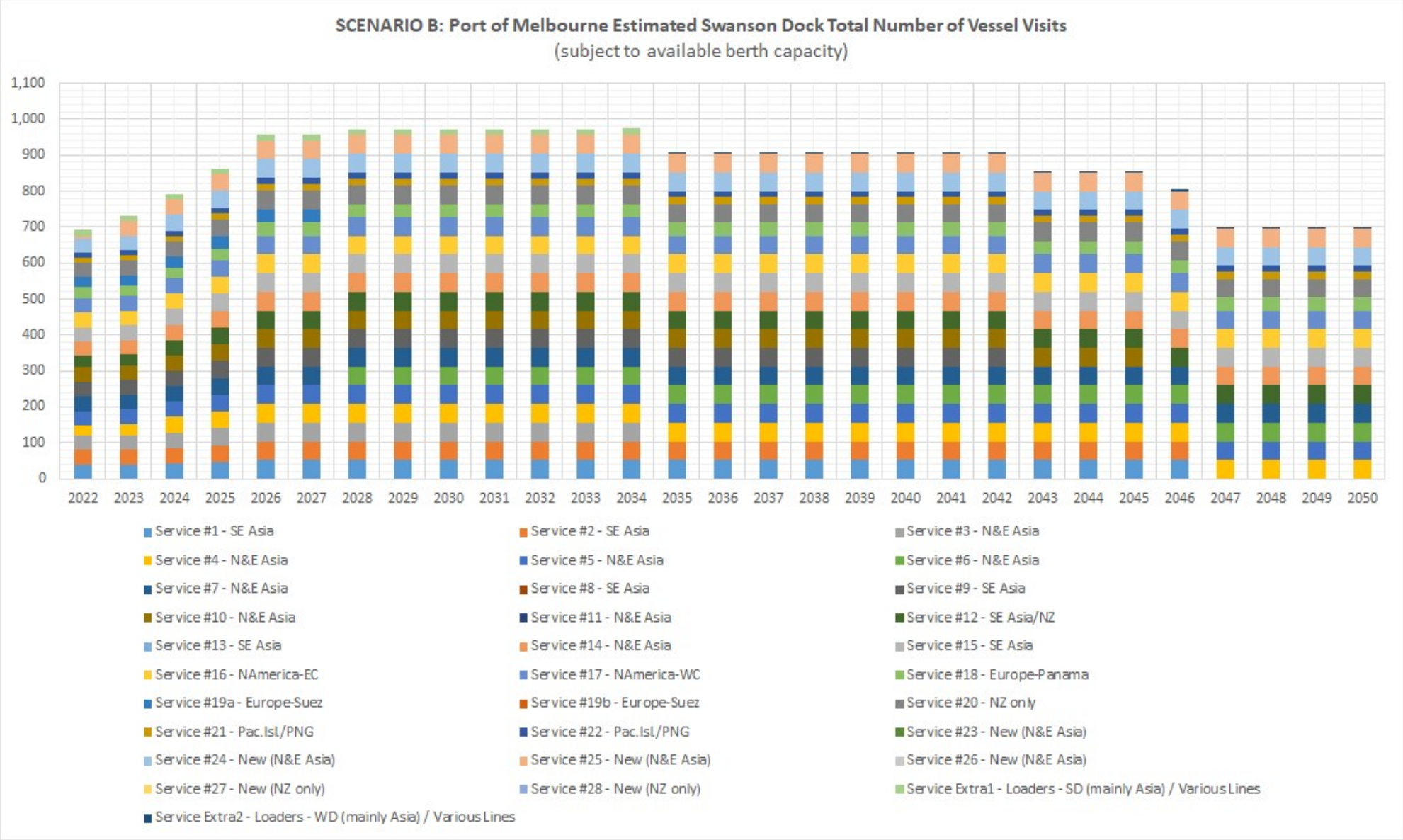
Figure 16



Modelling Results – Scenario B

6.9 Estimated Number of Future Vessel Visits by Service – Swanson Dock

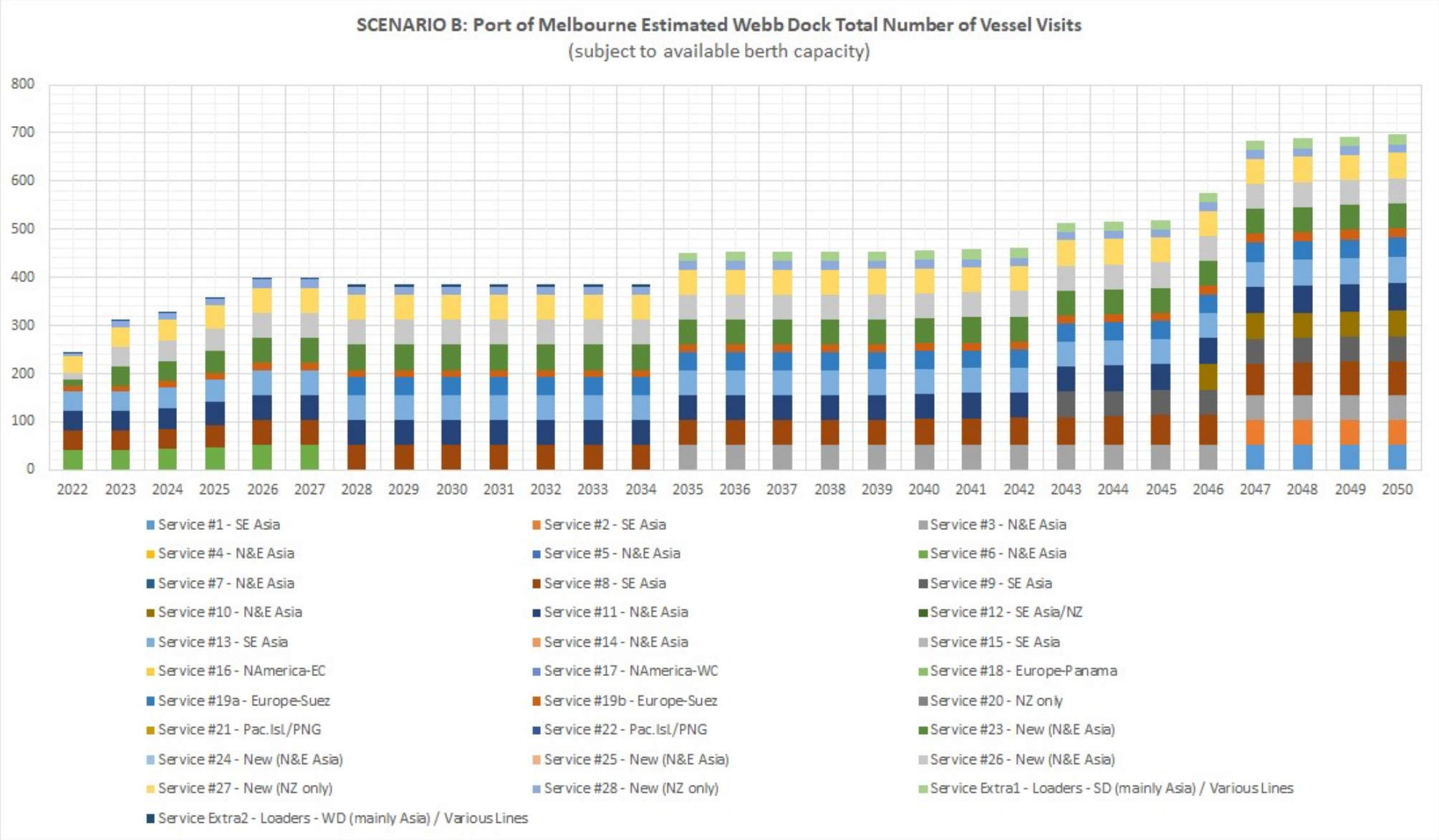
Figure 17



Modelling Results – Scenario B

6.10 Estimated Number of Future Vessel Visits by Service – Webb Dock

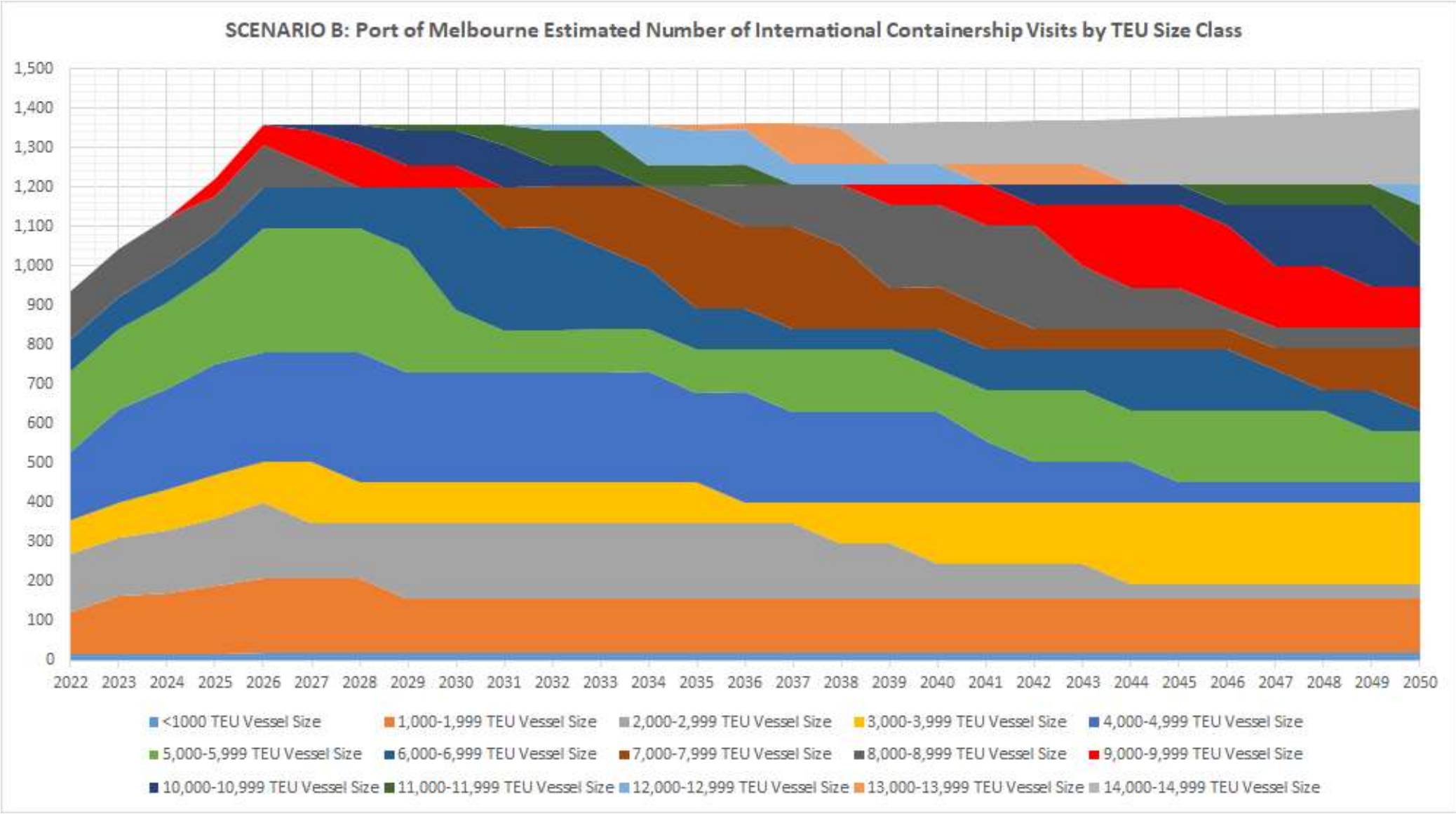
Figure 18



Modelling Results – Scenario B

6.11 Port of Melbourne Future Vessel Visits by Vessel TEU Size Class

Figure 19



Key Conclusions

7.1 Modelling of the future Melbourne visiting containership fleet to 2050

7.1.1 Shipping routes and trade-lanes

The modelling shows that the **services on the N&E Asia, SE Asia and Europe/M.East (via. Suez) shipping routes will drive the growth both in the international container throughput** at the Port of Melbourne (total trade assumed to increase from around a current 3 million TEU per year to around 3.8 million TEU per year in 2030, around 5.0 million TEU per year in 2040, and reaching around 6.2 million TEU per year by 2050), **as well as ship size increases**.

7.1.2 Port access constraints

At the assumed general maximum of 10,000 TEU for Swanson Dock access and using the various modelling assumptions, **around half of the Port of Melbourne currently visiting Asian services will reach this 10,000 TEU size threshold in the period 2040-2047**. There are two Asian services that may reach this threshold around 2029, and the remainder after 2050. **The assumed Heads threshold of 14,000 TEU is not met by 2050 for the Asian services (maximum sizes estimated at around 12,500 TEU by 2050**), but the Europe/M.East (via Suez) service(s) may meet this threshold before 2040.

7.1.3 Port precincts

With the assumptions used on port precinct capacity, trade and ship size growth, and vessel access limits, **the Swanson Dock precinct may have modelled vessel visits generating from over 2 million TEU per year up to a peak of 2.5-3 million TEU per year until 2040, and then dropping to less than 2.5 million TEU per year for the period 2047-2050** as the 10,000 TEU access limit is reached by a number of the Asian services - most of these access-constrained services are then assumed to transfer to the Webb Dock precinct. **The Webb Dock precinct is assumed to receive the remainder of port trade throughput** with after 2040 a number of the smaller vessel services assumed transferring to the Swanson Dock precinct to free-up capacity for large vessels not able to call at Swanson Dock.

7.1.4 Throughput carried by containerships up to 11,500 TEU nominal capacity in 2050

It was noted in section 4.3 that there are currently three vessels of 11,568 TEU nominal capacity with LOA of 314m and beam 48m in the global fleet which could theoretically currently access Swanson Dock. However, it would typically need a minimum of five vessels to operate a weekly Asian vessel string so as a result the current general size limit for Swanson Dock in the modelling was set at 10,000 TEU. However, by 2050, the global containership fleet with future possible newbuilds may provide a sufficient supply of vessels of 11,000-11,500 TEU which could theoretically access Swanson Dock. **The modelling estimates that in 2050 around 3.76 million TEU of PoM's international container trade could be carried by vessels up to 11,500 TEU.**

Key Conclusions

7.2 Sensitivity to different shipping line approaches

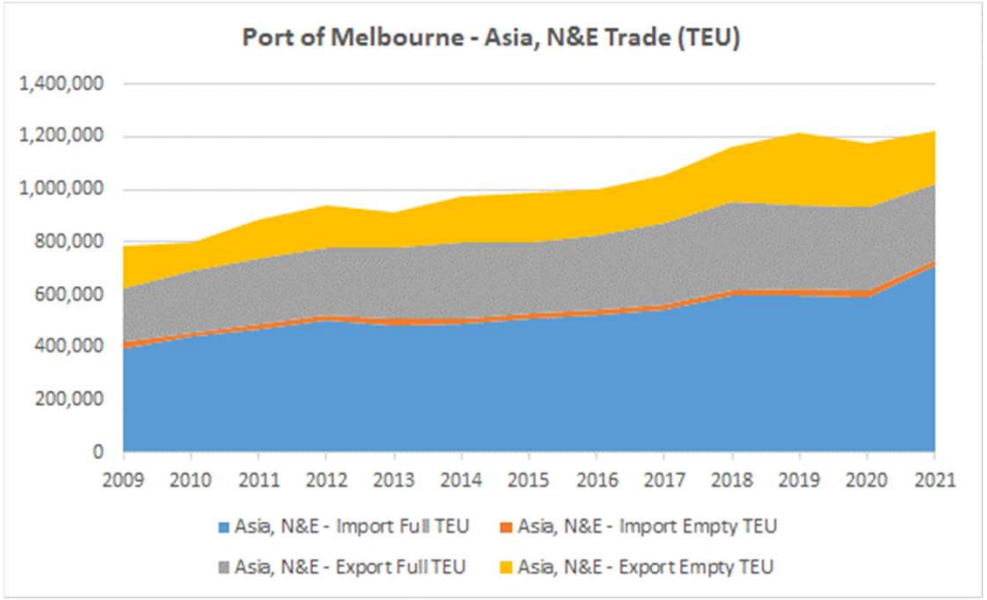
7.2.1 Some lines maintaining vessel sizes at 7,000-10,000 TEU for some (SE) Asia services

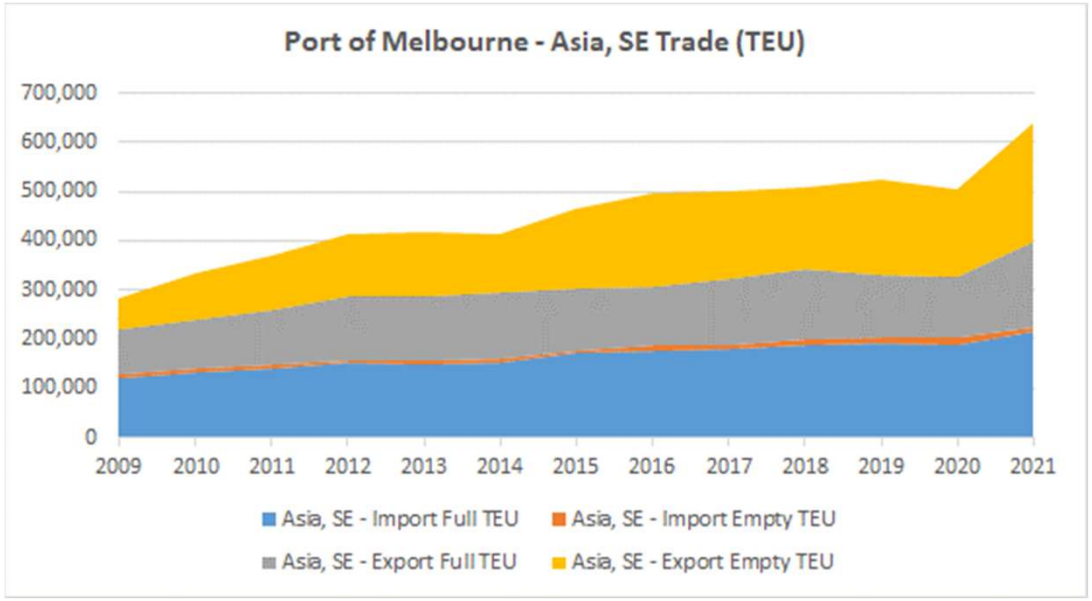
The impact of this approach would be to increase vessel visits as additional services are added. This could represent an extra 52 to several hundred visits per year depending the number of lines adopting this approach and available port capacity. This would benefit the Swanson Dock precinct in terms of long-term utilisation.

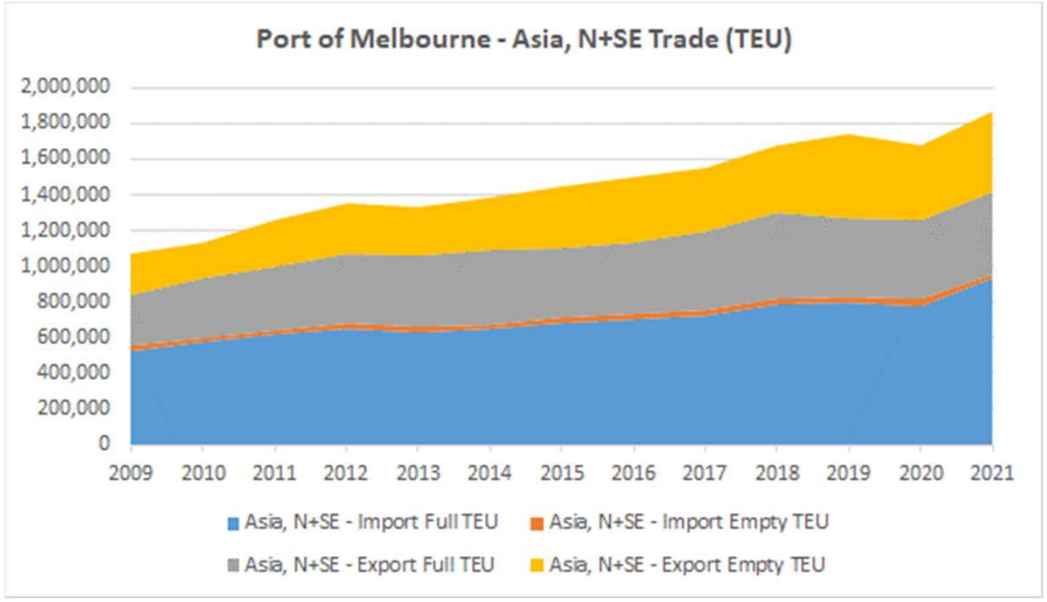
7.2.2 Some lines decide to consolidate some (N&E) Asia services as a response to IMO new regulations in 2023

The impact of this approach would be to reduce vessel visits (52 to several hundred visits per year) as services are consolidated and a potential doubling of vessel size on the remaining services (i.e. from say 5,000 TEU to 9-10,000 TEU size). This would mean Swanson Dock access is faster a constraint and the resulting larger vessels would need to use Webb Dock earlier.

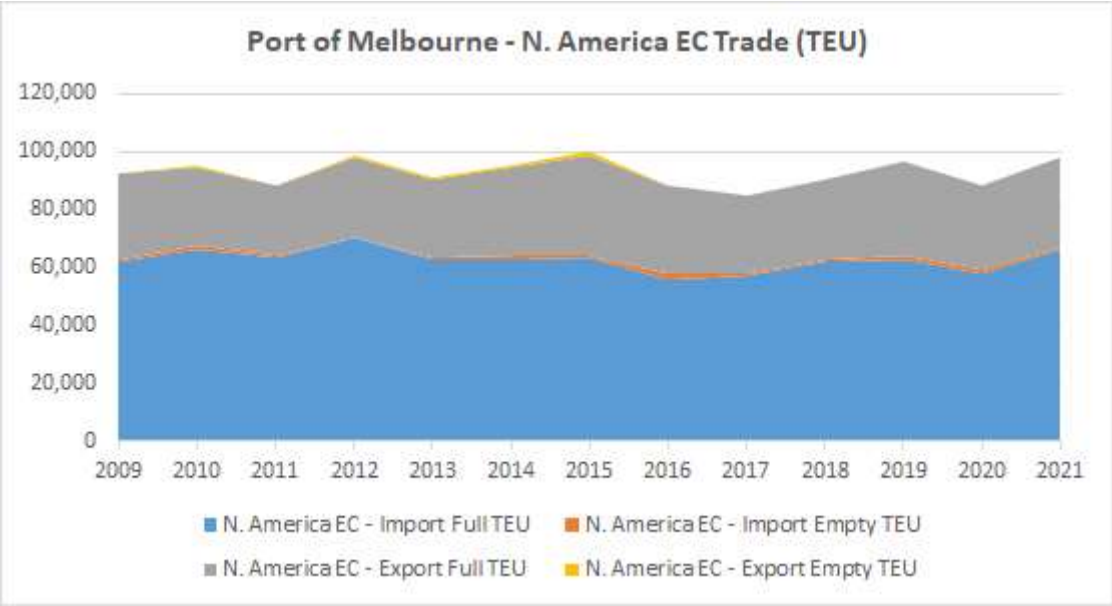
Port of Melbourne Main Trade Route Developments (last 10 years)

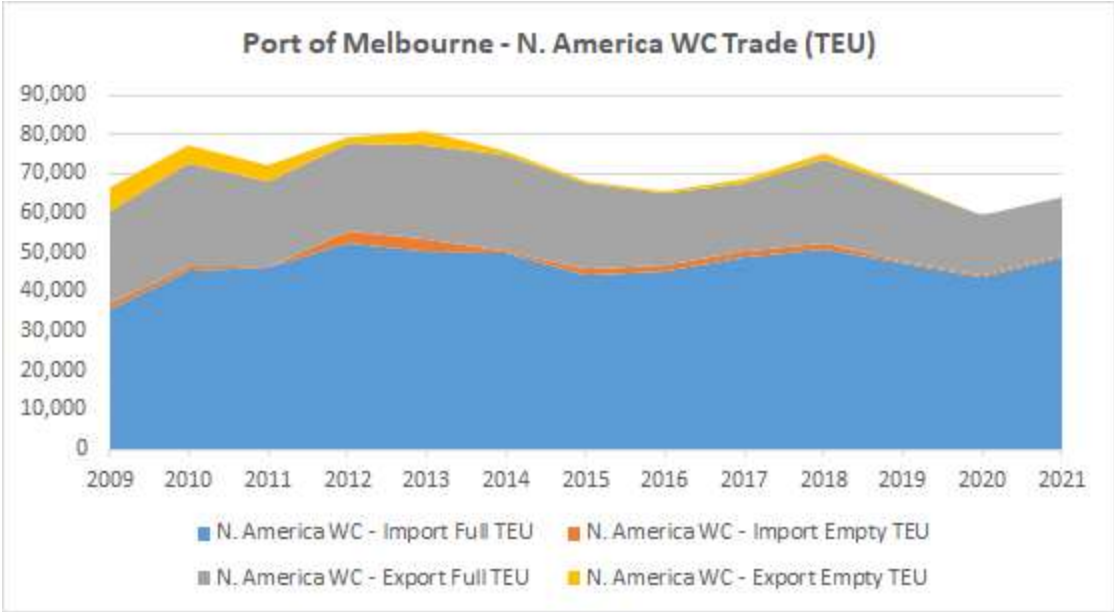




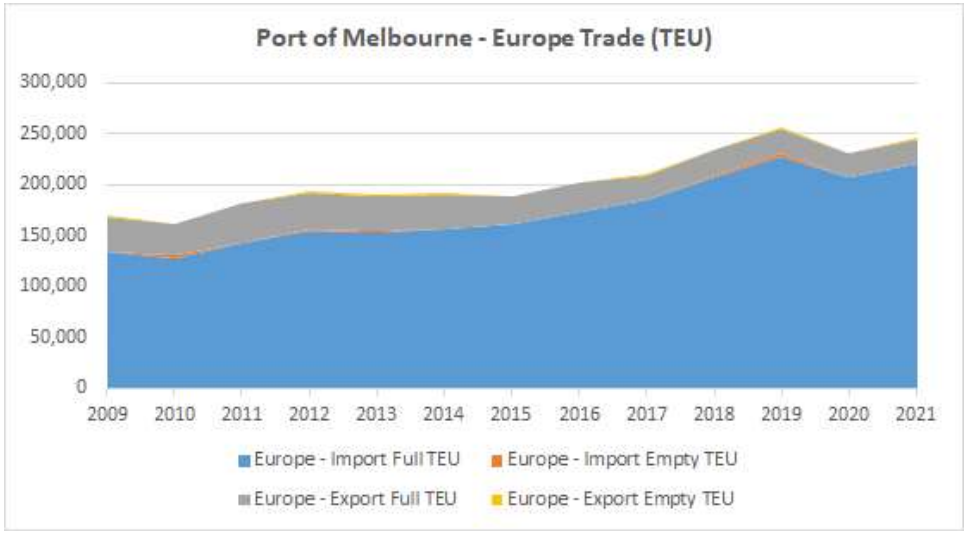


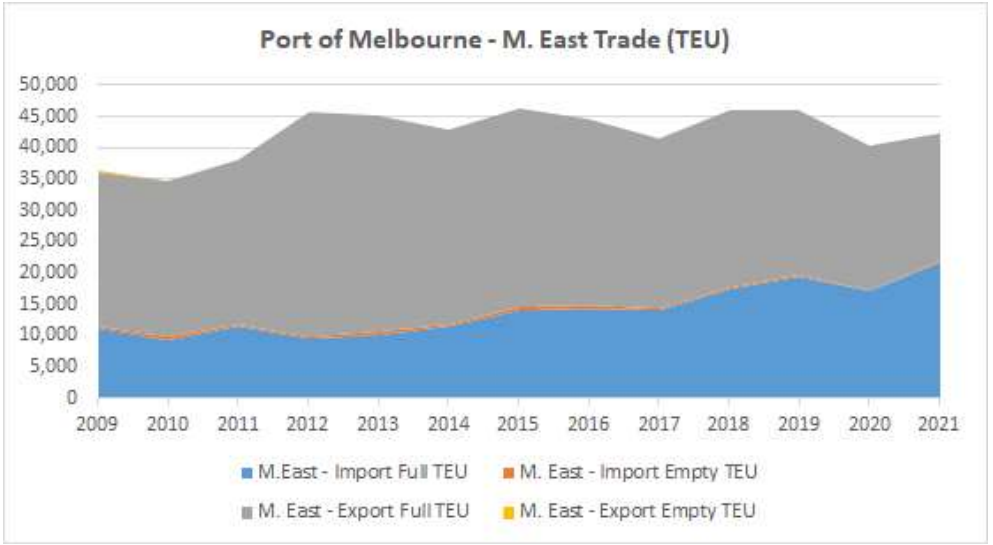
Port of Melbourne Main Trade Route Developments (last 10 years)

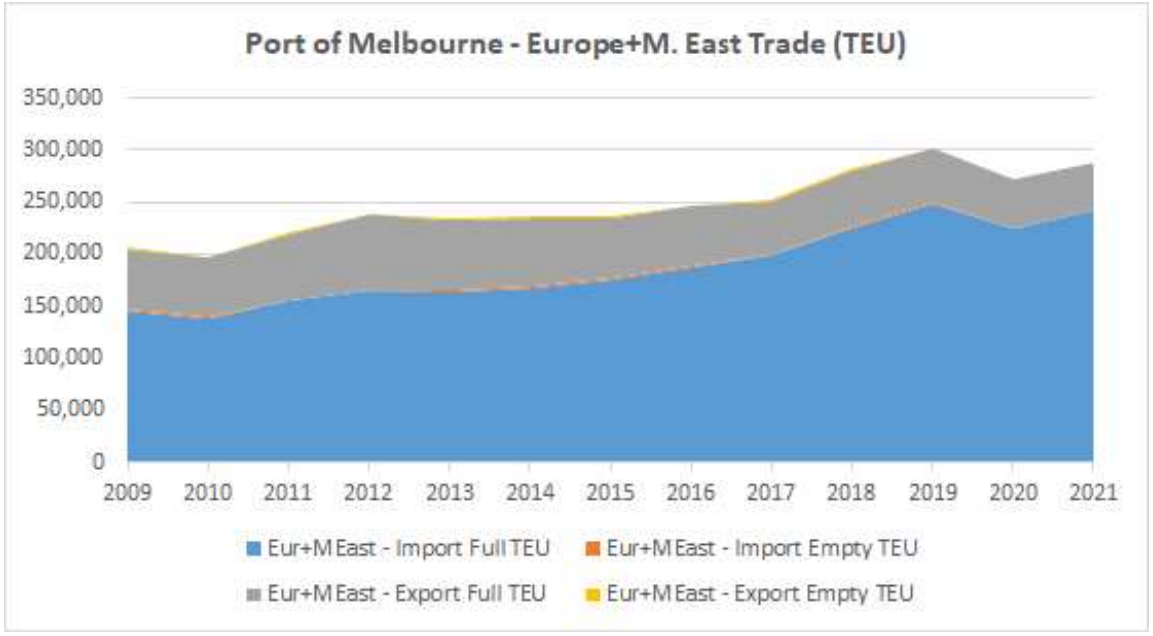




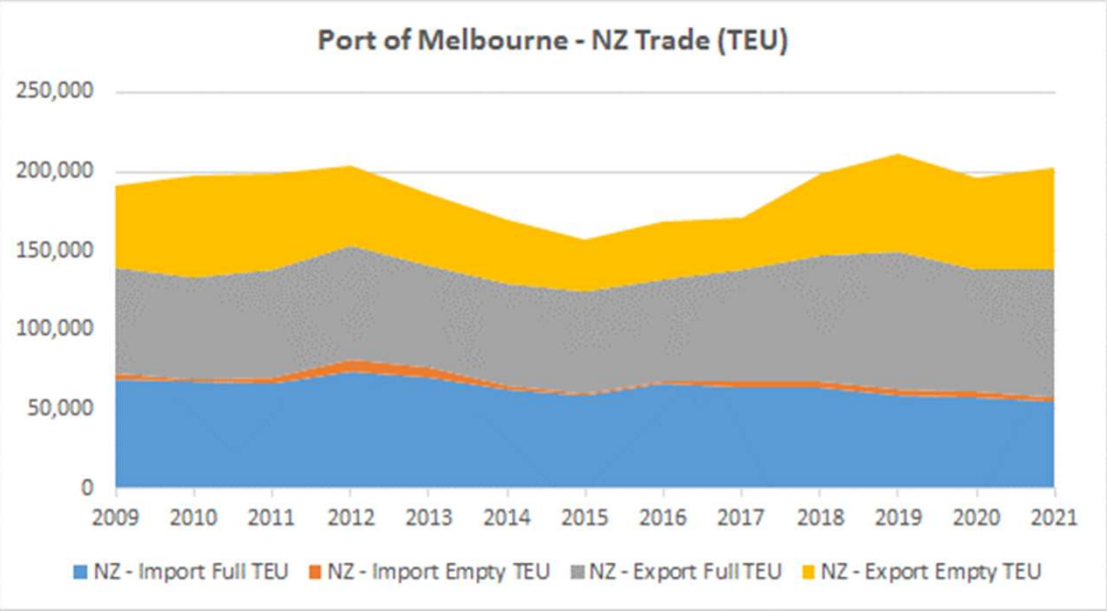
Port of Melbourne Main Trade Route Developments (last 10 years)

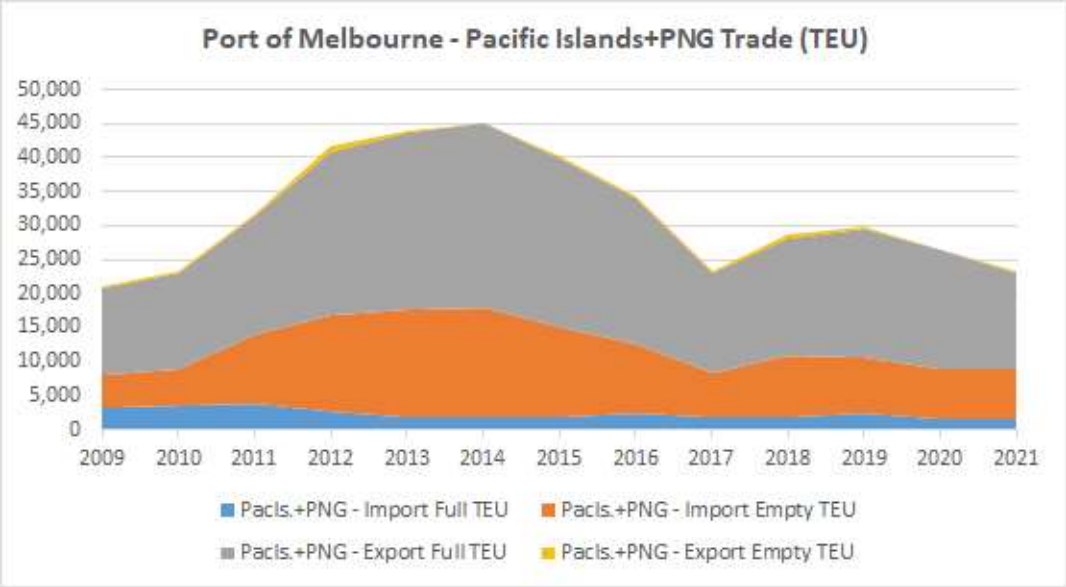






Port of Melbourne Main Trade Route Developments (last 10 years)





Port of Melbourne International Containership Visits (last 10 years)

Development of Port of Melbourne Vessel Visits by Nominal TEU Size Class											
Nominal TEU Size Class	**FY2011-12**	**FY2012-13**	**FY2013-14**	**FY2014-15**	**FY2015-16**	**FY2016-17**	**FY2017-18**	**FY2018-19**	**FY2019-20**	**FY2020-21**	**2021 Jul.-Dec.**
<1,000 TEU Vessel Size	70	74	50	55	57	64	77	43	59	18	3
1,000-1,999 TEU Vessel Size	109	42	45	38	106	126	144	71	73	77	52
2,000-2,999 TEU Vessel Size	347	220	132	125	99	71	80	60	47	96	71
3,000-3,999 TEU Vessel Size	179	161	131	118	126	150	126	118	106	84	36
4,000-4,999 TEU Vessel Size	443	531	497	556	502	347	223	317	272	179	72
5,000-5,999 TEU Vessel Size	44	36	159	145	189	285	341	310	239	234	108
6,000-6,999 TEU Vessel Size	0	0	2	11	16	55	100	99	44	71	39
7,000-7,999 TEU Vessel Size	0	0	0	0	1	9	11	11	6	5	0
8,000-8,999 TEU Vessel Size	0	0	0	0	0	0	0	35	76	103	38
9,000-9,999 TEU Vessel Size	0	0	0	0	0	0	0	0	27	39	28
10,000-10,999 TEU Vessel Size	0	0	0	0	0	0	0	0	1	8	0
11,000-11,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	0	0
12,000-12,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	0	0
13,000-13,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	0	0
14,000-14,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	0	0
Total Number Visits	**1,192**	**1,064**	**1,016**	**1,048**	**1,096**	**1,107**	**1,102**	**1,064**	**950**	**914**	**447**

Source: GHD analysis of PoM Actual Vessel Visit Records, 2011-2021

Port of Melbourne International Containership Visits (last 10 years)

Share of Port of Melbourne Vessel Visits by Nominal TEU Size Class											
Nominal TEU Size Class	**FY2011-12**	**FY2012-13**	**FY2013-14**	**FY2014-15**	**FY2015-16**	**FY2016-17**	**FY2017-18**	**FY2018-19**	**FY2019-20**	**FY2020-21**	**2021 Jul.-Dec.**
<1,000 TEU Vessel Size	6%	7%	5%	5%	5%	6%	7%	4%	6%	2%	1%
1,000-1,999 TEU Vessel Size	9%	4%	4%	4%	10%	11%	13%	7%	8%	8%	12%
2,000-2,999 TEU Vessel Size	29%	21%	13%	12%	9%	6%	7%	6%	5%	11%	16%
3,000-3,999 TEU Vessel Size	15%	15%	13%	11%	11%	14%	11%	11%	11%	9%	8%
4,000-4,999 TEU Vessel Size	37%	50%	49%	53%	46%	31%	20%	30%	29%	20%	16%
5,000-5,999 TEU Vessel Size	4%	3%	16%	14%	17%	26%	31%	29%	25%	26%	24%
6,000-6,999 TEU Vessel Size	0%	0%	0%	1%	1%	5%	9%	9%	5%	8%	9%
7,000-7,999 TEU Vessel Size	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	0%
8,000-8,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	3%	8%	11%	9%
9,000-9,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	3%	4%	6%
10,000-10,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
11,000-11,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12,000-12,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13,000-13,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14,000-14,999 TEU Vessel Size	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total:	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: GHD analysis of PoM Actual Vessel Visit Records, 2011-2021

Modelling Results Detail for Fleet Scenario A

PoM Estimated Number Vessel Visits by TEU Size Class	2022	2023	2024	2025	2026	2027	2028	2029	2030
<1000 TEU Vessel Size	14	16	17	18	18	18	18	18	18
1,000-1,999 TEU Vessel Size	109	118	132	139	139	139	139	139	139
2,000-2,999 TEU Vessel Size	147	75	84	89	89	89	89	89	89
3,000-3,999 TEU Vessel Size	88	91	115	120	104	104	52	52	52
4,000-4,999 TEU Vessel Size	171	208	247	208	224	224	224	224	224
5,000-5,999 TEU Vessel Size	206	224	250	315	263	263	211	211	107
6,000-6,999 TEU Vessel Size	81	133	148	156	208	208	260	208	260
7,000-7,999 TEU Vessel Size	0	0	0	0	0	0	52	104	156
8,000-8,999 TEU Vessel Size	122	133	148	104	52	0	0	0	0
9,000-9,999 TEU Vessel Size	0	0	0	52	104	141	104	52	0
10,000-10,999 TEU Vessel Size	0	0	0	0	0	15	52	89	141
11,000-11,999 TEU Vessel Size	0	0	0	0	0	0	0	15	15
12,000-12,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
13,000-13,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
14,000-14,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
PoM: Total Number of International Containership Visits	**937**	**997**	**1,141**	**1,201**	**1,201**	**1,201**	**1,201**	**1,201**	**1,201**

Modelling Results Detail for Fleet Scenario A

PoM Estimated Number Vessel Visits by TEU Size Class	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
<1000 TEU Vessel Size	18	18	18	18	18	18	18	18	18	18
1,000-1,999 TEU Vessel Size	139	139	139	139	139	139	139	139	139	139
2,000-2,999 TEU Vessel Size	89	89	89	89	89	89	89	89	89	37
3,000-3,999 TEU Vessel Size	52	52	52	52	52	52	52	52	52	104
4,000-4,999 TEU Vessel Size	224	224	225	226	174	175	123	124	124	124
5,000-5,999 TEU Vessel Size	107	107	108	56	108	56	108	108	108	108
6,000-6,999 TEU Vessel Size	208	156	104	104	52	104	104	104	52	52
7,000-7,999 TEU Vessel Size	208	208	208	260	208	208	156	52	52	52
8,000-8,999 TEU Vessel Size	0	52	104	104	208	156	208	260	260	208
9,000-9,999 TEU Vessel Size	0	0	0	0	0	52	52	104	156	156
10,000-10,999 TEU Vessel Size	104	0	0	0	0	0	0	0	0	52
11,000-11,999 TEU Vessel Size	52	141	141	52	0	0	0	0	0	0
12,000-12,999 TEU Vessel Size	0	15	15	104	141	141	52	0	0	0
13,000-13,999 TEU Vessel Size	0	0	0	0	15	15	104	141	52	52
14,000-14,999 TEU Vessel Size	0	0	0	0	0	0	0	15	105	107
PoM: Total Number of International Containership Visits	**1,201**	**1,201**	**1,203**	**1,204**	**1,204**	**1,205**	**1,205**	**1,206**	**1,207**	**1,209**

Modelling Results Detail for Fleet Scenario A

PoM Estimated Number Vessel Visits by TEU Size Class	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
<1000 TEU Vessel Size	18	18	18	18	18	18	18	18	18	18
1,000-1,999 TEU Vessel Size	139	139	139	139	139	139	139	139	139	139
2,000-2,999 TEU Vessel Size	37	37	37	37	37	37	37	37	37	37
3,000-3,999 TEU Vessel Size	104	104	104	104	104	104	104	104	104	104
4,000-4,999 TEU Vessel Size	52	52	52	52	52	52	52	52	52	52
5,000-5,999 TEU Vessel Size	232	232	232	180	180	180	181	181	25	25
6,000-6,999 TEU Vessel Size	104	52	52	104	104	104	104	52	208	156
7,000-7,999 TEU Vessel Size	52	104	104	104	52	52	52	52	52	104
8,000-8,999 TEU Vessel Size	208	104	0	0	52	52	52	104	104	52
9,000-9,999 TEU Vessel Size	156	208	260	208	208	104	52	0	0	52
10,000-10,999 TEU Vessel Size	0	52	104	156	156	156	209	262	211	160
11,000-11,999 TEU Vessel Size	0	0	0	0	0	104	104	104	156	156
12,000-12,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	52
13,000-13,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	0
14,000-14,999 TEU Vessel Size	161	164	167	170	174	178	182	186	190	194
PoM: Total Number of International Containership Visits	**1,262**	**1,266**	**1,269**	**1,272**	**1,275**	**1,279**	**1,285**	**1,291**	**1,295**	**1,301**

SCENARIO A: PoM Estimated Total Vessel GT by shipping route	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	37,436,952	41,785,519	48,179,191	51,318,383	52,025,709	53,208,037	54,966,928	56,716,970	58,427,286
Shipping Route: North America (East Coast & West Coast)	3,365,650	3,667,695	4,099,189	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936
Shipping Route: Europe (via Panama & Suez)	4,575,443	4,986,060	5,572,655	6,213,946	6,422,224	6,629,388	6,838,729	7,042,802	7,243,763
Shipping Route: New Zealand & Pacific Islands/PNG	1,653,470	1,962,957	2,193,893	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**47,031,515**	**52,402,231**	**60,044,928**	**64,156,626**	**65,072,229**	**66,461,722**	**68,429,954**	**70,384,068**	**72,295,346**

SCENARIO A: Average Vessel TEU Size by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	5,064	5,461	5,447	5,519	5,595	5,722	5,908	6,095	6,278
Shipping Route: North America (East Coast & West Coast)	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,797
Shipping Route: Europe (via Panama & Suez)	6,066	6,066	6,066	6,426	6,641	6,855	7,072	7,283	7,491
Shipping Route: New Zealand & Pacific Islands/PNG	1,372	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**4,593**	**4,809**	**4,814**	**4,891**	**4,961**	**5,066**	**5,214**	**5,363**	**5,508**

SCENARIO A: Total Number Vessel Visits by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	677	700	809	851	851	851	851	852	852
Shipping Route: North America (East Coast & West Coast)	81	88	99	104	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	69	75	84	89	89	89	89	89	89
Shipping Route: New Zealand & Pacific Islands/PNG	110	133	149	157	157	157	157	157	157
All International Shipping Routes	**937**	**997**	**1,141**	**1,201**	**1,201**	**1,201**	**1,201**	**1,201**	**1,201**

SCENARIO A: Total Vessel Two-way Capacity by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	6,852,201	7,648,132	8,818,386	9,392,962	9,522,426	9,738,831	10,060,766	10,381,082	10,694,126
Shipping Route: North America (East Coast & West Coast)	616,025	671,310	750,287	789,776	789,776	789,776	789,776	789,776	789,776
Shipping Route: Europe (via Panama & Suez)	837,457	912,614	1,019,980	1,137,358	1,175,479	1,213,397	1,251,714	1,289,066	1,325,848
Shipping Route: New Zealand & Pacific Islands/PNG	302,640	359,286	401,555	422,689	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**8,608,323**	**9,591,342**	**10,990,208**	**11,742,785**	**11,910,371**	**12,164,694**	**12,524,946**	**12,882,613**	**13,232,440**

SCENARIO A: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	79.60%	79.74%	80.24%	79.99%	79.95%	80.06%	80.33%	80.58%	80.82%
Shipping Route: North America (East Coast & West Coast)	7.16%	7.00%	6.83%	6.73%	6.63%	6.49%	6.31%	6.13%	5.97%
Shipping Route: Europe (via Panama & Suez)	9.73%	9.51%	9.28%	9.69%	9.87%	9.97%	9.99%	10.01%	10.02%
Shipping Route: New Zealand & Pacific Islands/PNG	3.52%	3.75%	3.65%	3.60%	3.55%	3.47%	3.37%	3.28%	3.19%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

SCENARIO A: PoM Estimated Total Vessel GT by shipping route	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	60,135,182	61,867,253	63,732,230	65,820,575	67,657,593	69,523,949	71,592,310	73,559,455	75,448,730	77,410,311
Shipping Route: North America (East Coast & West Coast)	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,315,885	4,319,251
Shipping Route: Europe (via Panama & Suez)	7,444,680	7,644,902	7,842,228	8,039,568	8,230,557	8,419,149	8,612,504	8,810,181	9,003,618	9,060,435
Shipping Route: New Zealand & Pacific Islands/PNG	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**74,204,159**	**76,136,452**	**78,198,755**	**80,484,439**	**82,512,446**	**84,567,395**	**86,829,110**	**88,993,933**	**91,077,594**	**93,099,358**

SCENARIO A: Average Vessel TEU Size by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	6,464	6,647	6,834	7,050	7,247	7,441	7,662	7,863	8,061	8,257
Shipping Route: North America (East Coast & West Coast)	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,798	3,801
Shipping Route: Europe (via Panama & Suez)	7,698	7,905	8,110	8,314	8,511	8,706	8,906	9,074	9,234	9,254
Shipping Route: New Zealand & Pacific Islands/PNG	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**5,655**	**5,800**	**5,949**	**6,118**	**6,272**	**6,425**	**6,597**	**6,753**	**6,906**	**7,050**

SCENARIO A: Total Number Vessel Visits by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	851	852	853	854	854	855	855	856	857	858
Shipping Route: North America (East Coast & West Coast)	104	104	104	104	104	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	89	89	89	89	89	89	89	89	89	90
Shipping Route: New Zealand & Pacific Islands/PNG	157	157	157	157	157	157	157	157	157	157
All International Shipping Routes	**1,201**	**1,201**	**1,203**	**1,204**	**1,204**	**1,205**	**1,205**	**1,206**	**1,207**	**1,209**

SCENARIO A: Total Vessel Two-way Capacity by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	11,006,728	11,323,754	11,665,107	12,047,343	12,383,578	12,725,183	13,103,761	13,463,814	13,809,614	14,168,648
Shipping Route: North America (East Coast & West Coast)	789,776	789,776	789,776	789,776	789,776	789,776	789,776	789,776	789,950	790,566
Shipping Route: Europe (via Panama & Suez)	1,362,623	1,399,270	1,435,387	1,471,507	1,506,464	1,540,983	1,576,373	1,612,555	1,647,960	1,658,359
Shipping Route: New Zealand & Pacific Islands/PNG	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**13,581,816**	**13,935,490**	**14,312,959**	**14,731,315**	**15,102,508**	**15,478,631**	**15,892,600**	**16,288,834**	**16,670,213**	**17,040,263**

SCENARIO A: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	81.04%	81.26%	81.50%	81.78%	82.00%	82.21%	82.45%	82.66%	82.84%	83.15%
Shipping Route: North America (East Coast & West Coast)	5.81%	5.67%	5.52%	5.36%	5.23%	5.10%	4.97%	4.85%	4.74%	4.64%
Shipping Route: Europe (via Panama & Suez)	10.03%	10.04%	10.03%	9.99%	9.97%	9.96%	9.92%	9.90%	9.89%	9.73%
Shipping Route: New Zealand & Pacific Islands/PNG	3.11%	3.03%	2.95%	2.87%	2.80%	2.73%	2.66%	2.59%	2.54%	2.48%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

SCENARIO A: PoM Estimated Total Vessel GT by shipping route	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	79,350,938	81,325,345	83,294,522	85,367,428	87,351,482	89,404,661	91,460,465	93,439,632	95,620,325	97,637,638
Shipping Route: North America (East Coast & West Coast)	4,322,639	4,326,063	4,329,514	4,332,989	4,336,488	4,339,992	4,343,506	4,347,052	4,350,642	4,354,262
Shipping Route: Europe (via Panama & Suez)	9,117,623	9,175,411	9,233,641	9,292,301	9,351,352	9,509,519	9,691,580	9,875,353	10,061,349	10,248,928
Shipping Route: New Zealand & Pacific Islands/PNG	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**95,100,561**	**97,136,180**	**99,167,038**	**101,302,080**	**103,348,682**	**105,563,533**	**107,804,911**	**109,971,398**	**112,341,678**	**114,550,188**

SCENARIO A: Average Vessel TEU Size by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	7,970	8,140	8,308	8,494	8,661	8,842	8,996	9,148	9,326	9,478
Shipping Route: North America (East Coast & West Coast)	3,804	3,807	3,810	3,813	3,816	3,819	3,822	3,825	3,828	3,832
Shipping Route: Europe (via Panama & Suez)	9,273	9,293	9,313	9,333	9,352	9,404	9,463	9,520	9,577	9,632
Shipping Route: New Zealand & Pacific Islands/PNG	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**6,896**	**7,024**	**7,150**	**7,289**	**7,415**	**7,554**	**7,677**	**7,797**	**7,936**	**8,057**

SCENARIO A: Total Number Vessel Visits by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	911	914	917	920	923	925	930	935	938	943
Shipping Route: North America (East Coast & West Coast)	104	104	104	104	104	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	90	90	91	91	92	93	94	95	96	97
Shipping Route: New Zealand & Pacific Islands/PNG	157	157	157	157	157	157	157	157	157	157
All International Shipping Routes	**1,262**	**1,266**	**1,269**	**1,272**	**1,275**	**1,279**	**1,285**	**1,291**	**1,295**	**1,301**

SCENARIO A: Total Vessel Two-way Capacity by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	14,523,847	14,885,229	15,245,653	15,625,064	15,988,211	16,364,011	16,740,291	17,102,544	17,501,683	17,870,918
Shipping Route: North America (East Coast & West Coast)	791,186	791,813	792,444	793,080	793,721	794,362	795,005	795,654	796,311	796,974
Shipping Route: Europe (via Panama & Suez)	1,668,827	1,679,404	1,690,062	1,700,799	1,711,607	1,740,557	1,773,880	1,807,516	1,841,560	1,875,893
Shipping Route: New Zealand & Pacific Islands/PNG	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**17,406,549**	**17,779,135**	**18,150,849**	**18,541,632**	**18,916,228**	**19,321,619**	**19,731,865**	**20,128,404**	**20,562,244**	**20,966,474**

SCENARIO A: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	83.44%	83.72%	83.99%	84.27%	84.52%	84.69%	84.84%	84.97%	85.12%	85.24%
Shipping Route: North America (East Coast & West Coast)	4.55%	4.45%	4.37%	4.28%	4.20%	4.11%	4.03%	3.95%	3.87%	3.80%
Shipping Route: Europe (via Panama & Suez)	9.59%	9.45%	9.31%	9.17%	9.05%	9.01%	8.99%	8.98%	8.96%	8.95%
Shipping Route: New Zealand & Pacific Islands/PNG	2.43%	2.38%	2.33%	2.28%	2.23%	2.19%	2.14%	2.10%	2.06%	2.02%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Modelling Results Detail for Fleet Scenario B

PoM Estimated Number Vessel Visits by TEU Size Class	2022	2023	2024	2025	2026	2027	2028	2029	2030
<1000 TEU Vessel Size	14	14	15	16	18	18	18	18	18
1,000-1,999 TEU Vessel Size	109	149	157	172	191	191	191	139	139
2,000-2,999 TEU Vessel Size	147	150	159	173	193	141	141	193	193
3,000-3,999 TEU Vessel Size	88	88	102	110	104	156	104	104	104
4,000-4,999 TEU Vessel Size	171	234	257	281	276	276	328	276	276
5,000-5,999 TEU Vessel Size	206	206	218	237	315	315	315	315	159
6,000-6,999 TEU Vessel Size	81	81	86	94	104	104	104	156	312
7,000-7,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
8,000-8,999 TEU Vessel Size	122	122	129	94	104	52	0	0	0
9,000-9,999 TEU Vessel Size	0	0	0	47	52	89	104	52	52
10,000-10,999 TEU Vessel Size	0	0	0	0	0	15	52	89	89
11,000-11,999 TEU Vessel Size	0	0	0	0	0	0	0	15	15
12,000-12,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
13,000-13,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
14,000-14,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0
PoM: Total Number of International Containership Visits	**937**	**1,044**	**1,122**	**1,223**	**1,357**	**1,357**	**1,357**	**1,357**	**1,357**

Modelling Results Detail for Fleet Scenario B

PoM Estimated Number Vessel Visits by TEU Size Class	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
<1000 TEU Vessel Size	18	18	18	18	18	18	18	18	18	18
1,000-1,999 TEU Vessel Size	139	139	139	139	139	139	139	139	139	139
2,000-2,999 TEU Vessel Size	193	193	193	193	193	193	193	141	141	89
3,000-3,999 TEU Vessel Size	104	104	104	104	104	52	52	104	104	156
4,000-4,999 TEU Vessel Size	276	277	277	278	226	279	227	228	228	228
5,000-5,999 TEU Vessel Size	107	107	108	108	108	108	160	160	160	108
6,000-6,999 TEU Vessel Size	260	260	208	156	104	104	52	52	52	104
7,000-7,999 TEU Vessel Size	104	104	156	208	260	208	260	208	104	104
8,000-8,999 TEU Vessel Size	0	0	0	0	52	104	104	156	208	208
9,000-9,999 TEU Vessel Size	0	0	0	0	0	0	0	0	52	52
10,000-10,999 TEU Vessel Size	104	52	52	0	0	0	0	0	0	0
11,000-11,999 TEU Vessel Size	52	89	89	52	52	52	0	0	0	0
12,000-12,999 TEU Vessel Size	0	15	15	104	89	89	52	52	52	52
13,000-13,999 TEU Vessel Size	0	0	0	0	15	15	104	89	0	0
14,000-14,999 TEU Vessel Size	0	0	0	0	0	0	0	15	105	107
PoM: Total Number of International Containership Visits	**1,357**	**1,358**	**1,359**	**1,360**	**1,360**	**1,361**	**1,361**	**1,362**	**1,363**	**1,365**

Modelling Results Detail for Fleet Scenario B

PoM Estimated Number Vessel Visits by TEU Size Class	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
<1000 TEU Vessel Size	18	18	18	18	18	18	18	18	18	18
1,000-1,999 TEU Vessel Size	139	139	139	139	139	139	139	139	139	139
2,000-2,999 TEU Vessel Size	89	89	89	37	37	37	37	37	37	37
3,000-3,999 TEU Vessel Size	156	156	156	208	208	208	208	208	208	208
4,000-4,999 TEU Vessel Size	156	104	104	104	52	52	52	52	52	52
5,000-5,999 TEU Vessel Size	128	180	180	128	180	180	181	181	129	129
6,000-6,999 TEU Vessel Size	104	104	104	156	156	156	104	52	104	52
7,000-7,999 TEU Vessel Size	104	52	52	52	52	52	52	104	104	156
8,000-8,999 TEU Vessel Size	208	260	156	104	104	52	52	52	52	52
9,000-9,999 TEU Vessel Size	104	52	156	208	208	208	156	156	104	104
10,000-10,999 TEU Vessel Size	0	52	52	52	52	52	156	156	208	104
11,000-11,999 TEU Vessel Size	0	0	0	0	0	52	52	52	52	104
12,000-12,999 TEU Vessel Size	0	0	0	0	0	0	0	0	0	52
13,000-13,999 TEU Vessel Size	52	52	52	0	0	0	0	0	0	0
14,000-14,999 TEU Vessel Size	109	111	113	167	170	174	178	182	186	190
PoM: Total Number of International Containership Visits	**1,366**	**1,368**	**1,370**	**1,373**	**1,376**	**1,380**	**1,385**	**1,389**	**1,393**	**1,397**

SCENARIO B: PoM Estimated Total Vessel GT by shipping route	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	37,436,952	41,189,738	44,380,097	48,357,135	54,418,631	55,321,753	56,600,484	57,999,497	59,486,148
Shipping Route: North America (East Coast & West Coast)	3,365,650	3,382,864	3,559,822	3,883,442	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936
Shipping Route: Europe (via Panama & Suez)	4,575,443	4,575,443	4,839,411	5,592,552	6,422,224	6,629,388	6,838,729	7,042,802	7,243,763
Shipping Route: New Zealand & Pacific Islands/PNG	1,653,470	1,801,302	1,905,223	2,078,425	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**47,031,515**	**50,949,346**	**54,684,553**	**59,911,553**	**67,465,152**	**68,575,438**	**70,063,510**	**71,666,595**	**73,354,208**

SCENARIO B: Average Vessel TEU Size by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	5,064	4,890	4,869	4,873	4,946	5,028	5,144	5,271	5,406
Shipping Route: North America (East Coast & West Coast)	3,797	3,799	3,797	3,797	3,797	3,797	3,797	3,797	3,797
Shipping Route: Europe (via Panama & Suez)	6,066	6,066	6,066	6,426	6,641	6,855	7,072	7,283	7,491
Shipping Route: New Zealand & Pacific Islands/PNG	1,372	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**4,593**	**4,467**	**4,459**	**4,484**	**4,552**	**4,626**	**4,727**	**4,835**	**4,949**

SCENARIO B: Total Number Vessel Visits by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	677	771	834	908	1,007	1,007	1,007	1,007	1,007
Shipping Route: North America (East Coast & West Coast)	81	81	86	94	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	69	69	73	80	89	89	89	89	89
Shipping Route: New Zealand & Pacific Islands/PNG	110	122	130	141	157	157	157	157	157
All International Shipping Routes	**937**	**1,044**	**1,122**	**1,223**	**1,357**	**1,357**	**1,357**	**1,357**	**1,357**

SCENARIO B: Total Vessel Two-way Capacity by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	6,852,201	7,539,085	8,123,026	8,850,956	9,960,410	10,125,711	10,359,761	10,615,827	10,887,933
Shipping Route: North America (East Coast & West Coast)	616,025	619,176	651,565	710,798	789,776	789,776	789,776	789,776	789,776
Shipping Route: Europe (via Panama & Suez)	837,457	837,457	885,772	1,023,622	1,175,479	1,213,397	1,251,714	1,289,066	1,325,848
Shipping Route: New Zealand & Pacific Islands/PNG	302,640	329,698	348,719	380,421	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**8,608,323**	**9,325,416**	**10,009,082**	**10,965,796**	**12,348,355**	**12,551,574**	**12,823,940**	**13,117,358**	**13,426,247**

SCENARIO B: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipping Route: Asia (N&E/SE) - incl. extra loaders	79.60%	80.84%	81.16%	80.71%	80.66%	80.67%	80.78%	80.93%	81.09%
Shipping Route: North America (East Coast & West Coast)	7.16%	6.64%	6.51%	6.48%	6.40%	6.29%	6.16%	6.02%	5.88%
Shipping Route: Europe (via Panama & Suez)	9.73%	8.98%	8.85%	9.33%	9.52%	9.67%	9.76%	9.83%	9.88%
Shipping Route: New Zealand & Pacific Islands/PNG	3.52%	3.54%	3.48%	3.47%	3.42%	3.37%	3.30%	3.22%	3.15%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

SCENARIO B: PoM Estimated Total Vessel GT by shipping route	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	61,131,607	62,790,046	64,454,633	66,366,150	68,181,817	69,827,716	71,708,932	73,622,236	75,463,930	77,342,614
Shipping Route: North America (East Coast & West Coast)	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,314,936	4,315,885	4,319,251
Shipping Route: Europe (via Panama & Suez)	7,444,680	7,644,902	7,842,228	8,039,568	8,230,557	8,419,149	8,612,504	8,810,181	9,003,618	9,060,435
Shipping Route: New Zealand & Pacific Islands/PNG	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**75,200,584**	**77,059,245**	**78,921,158**	**81,030,015**	**83,036,671**	**84,871,161**	**86,945,733**	**89,056,714**	**91,092,794**	**93,031,662**

SCENARIO B: Average Vessel TEU Size by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	5,556	5,701	5,846	6,013	6,178	6,321	6,491	6,658	6,822	6,980
Shipping Route: North America (East Coast & West Coast)	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,797	3,798	3,801
Shipping Route: Europe (via Panama & Suez)	7,698	7,905	8,110	8,314	8,511	8,706	8,906	9,074	9,234	9,254
Shipping Route: New Zealand & Pacific Islands/PNG	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**5,073**	**5,195**	**5,317**	**5,455**	**5,590**	**5,709**	**5,849**	**5,985**	**6,118**	**6,239**

SCENARIO B: Total Number Vessel Visits by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	1,007	1,008	1,009	1,010	1,010	1,011	1,011	1,012	1,012	1,014
Shipping Route: North America (East Coast & West Coast)	104	104	104	104	104	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	89	89	89	89	89	89	89	89	89	90
Shipping Route: New Zealand & Pacific Islands/PNG	157	157	157	157	157	157	157	157	157	157
All International Shipping Routes	**1,357**	**1,358**	**1,359**	**1,360**	**1,360**	**1,361**	**1,361**	**1,362**	**1,363**	**1,365**

SCENARIO B: Total Vessel Two-way Capacity by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	11,189,107	11,492,656	11,797,330	12,147,201	12,479,528	12,780,782	13,125,107	13,475,305	13,812,396	14,156,257
Shipping Route: North America (East Coast & West Coast)	789,776	789,776	789,776	789,776	789,776	789,776	789,776	789,776	789,950	790,566
Shipping Route: Europe (via Panama & Suez)	1,362,623	1,399,270	1,435,387	1,471,507	1,506,464	1,540,983	1,576,373	1,612,555	1,647,960	1,658,359
Shipping Route: New Zealand & Pacific Islands/PNG	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**13,764,195**	**14,104,391**	**14,445,183**	**14,831,174**	**15,198,458**	**15,534,230**	**15,913,946**	**16,300,325**	**16,672,995**	**17,027,872**

SCENARIO B: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Shipping Route: Asia (N&E/SE) - incl. extra loaders	81.29%	81.48%	81.67%	81.90%	82.11%	82.27%	82.48%	82.67%	82.84%	83.14%
Shipping Route: North America (East Coast & West Coast)	5.74%	5.60%	5.47%	5.33%	5.20%	5.08%	4.96%	4.85%	4.74%	4.64%
Shipping Route: Europe (via Panama & Suez)	9.90%	9.92%	9.94%	9.92%	9.91%	9.92%	9.91%	9.89%	9.88%	9.74%
Shipping Route: New Zealand & Pacific Islands/PNG	3.07%	3.00%	2.93%	2.85%	2.78%	2.72%	2.66%	2.59%	2.54%	2.48%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

SCENARIO B: PoM Estimated Total Vessel GT by shipping route	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	79,414,824	81,343,212	83,379,102	85,343,303	87,378,238	89,432,111	91,555,925	93,513,620	95,614,044	97,720,563
Shipping Route: North America (East Coast & West Coast)	4,322,639	4,326,063	4,329,514	4,332,989	4,336,488	4,339,992	4,343,506	4,347,052	4,350,642	4,354,262
Shipping Route: Europe (via Panama & Suez)	9,117,623	9,175,411	9,233,641	9,292,301	9,351,352	9,509,519	9,691,580	9,875,353	10,061,349	10,248,928
Shipping Route: New Zealand & Pacific Islands/PNG	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361	2,309,361
All International Shipping Routes (Regions): Total	**95,164,447**	**97,154,047**	**99,251,617**	**101,277,954**	**103,375,438**	**105,590,983**	**107,900,371**	**110,045,387**	**112,335,396**	**114,633,113**

SCENARIO B: Average Vessel TEU Size by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	7,158	7,320	7,492	7,653	7,814	7,976	8,135	8,286	8,449	8,611
Shipping Route: North America (East Coast & West Coast)	3,804	3,807	3,810	3,813	3,816	3,819	3,822	3,825	3,828	3,832
Shipping Route: Europe (via Panama & Suez)	9,273	9,293	9,313	9,333	9,352	9,404	9,463	9,520	9,577	9,632
Shipping Route: New Zealand & Pacific Islands/PNG	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
All International Shipping Routes: Total	**6,374**	**6,498**	**6,629**	**6,752**	**6,876**	**7,004**	**7,131**	**7,252**	**7,381**	**7,510**

SCENARIO B: Total Number Vessel Visits by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	1,015	1,017	1,019	1,021	1,023	1,026	1,030	1,033	1,036	1,039
Shipping Route: North America (East Coast & West Coast)	104	104	104	104	104	104	104	104	104	104
Shipping Route: Europe (via Panama & Suez)	90	90	91	91	92	93	94	95	96	97
Shipping Route: New Zealand & Pacific Islands/PNG	157	157	157	157	157	157	157	157	157	157
All International Shipping Routes	**1,366**	**1,368**	**1,370**	**1,373**	**1,376**	**1,380**	**1,385**	**1,389**	**1,393**	**1,397**

SCENARIO B: Total Vessel Two-way Capacity by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	14,535,540	14,888,499	15,261,134	15,620,648	15,993,108	16,369,035	16,757,763	17,116,086	17,500,533	17,886,096
Shipping Route: North America (East Coast & West Coast)	791,186	791,813	792,444	793,080	793,721	794,362	795,005	795,654	796,311	796,974
Shipping Route: Europe (via Panama & Suez)	1,668,827	1,679,404	1,690,062	1,700,799	1,711,607	1,740,557	1,773,880	1,807,516	1,841,560	1,875,893
Shipping Route: New Zealand & Pacific Islands/PNG	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689	422,689
All International Shipping Routes: Total	**17,418,242**	**17,782,405**	**18,166,330**	**18,537,216**	**18,921,125**	**19,326,643**	**19,749,338**	**20,141,947**	**20,561,094**	**20,981,652**

SCENARIO B: PoM Trade Share of Vessel Two-way Capacity by shipping route:	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shipping Route: Asia (N&E/SE) - incl. extra loaders	83.45%	83.73%	84.01%	84.27%	84.53%	84.70%	84.85%	84.98%	85.11%	85.25%
Shipping Route: North America (East Coast & West Coast)	4.54%	4.45%	4.36%	4.28%	4.19%	4.11%	4.03%	3.95%	3.87%	3.80%
Shipping Route: Europe (via Panama & Suez)	9.58%	9.44%	9.30%	9.18%	9.05%	9.01%	8.98%	8.97%	8.96%	8.94%
Shipping Route: New Zealand & Pacific Islands/PNG	2.43%	2.38%	2.33%	2.28%	2.23%	2.19%	2.14%	2.10%	2.06%	2.01%
All International Shipping Routes: Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A (Draft)	G. Reynolds	R. Hill	On file	R. Hill	On file	09/05/2022
B (Draft Final)	G. Reynolds	R. Hill	On file	R. Hill	On file	03/08/2022
C&D (Draft Final)	G. Reynolds	R. Hill	On file	R. Hill	On file	29/08/2022 & 30/08/2022
E (Final)	G. Reynolds	R. Hill	On file	R. Hill	On file	02/09/2022
F (Final Revised)	G. Reynolds	R. Hill	On file	R. Hill	On file	07/12/2022
G (Final Revised)	G. Reynolds	R. Hill	On file	R. Hill	On file	13/12/2022

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