

Joint Expert Statement: - Economics

Discussion Areas and Issues

NOTE: This document represents a draft statement of the position following conferencing between the experts, but is not a final agreed joint statement. During conferencing, Mr Murray identified a number of issues/concerns. In response, Mr Akehurst and Ms Fairgray undertook remodelling of aspects of their report. Unfortunately due to the time required to undertake this remodelling, and the condensed hearing timeframe, the updated (remodelled) material was not provided until 3pm Monday, providing insufficient time for Mr Murray to review and comment on it prior to the deadline for filing this statement at 4pm Monday. This document therefore sets out the issues Mr Murray raised last Friday and Mr Akehurst's response to those issues, but no response from Mr Murray on whether the matters he raised have been addressed or whether the response has given rise to additional matters. Each expert will prepare overnight a summary statement prior to appearing tomorrow.

1. Scope and Coverage of the ME Report;

ME Report

CRL have lodged a consent application before the EPA to allow them to dump up to 250,000m³ per annum of marine dredgings at the NDA (25km or so to the east of Great Barrier Island). Following a review of the initial economic assessment provided by Property Economics carried out by Kieran Murray (Sapere Research Group), ME were commissioned to provide additional information not contained in the Property Economics Report. Specifically, ME were asked to provide;

1. Additional information on the future demand for disposing of dredged material.
2. Sensitivity test the predicted quantities by altering assumptions supporting those predictions, including assumptions as to the price that would be charged for the Northern Disposal Area relative to other options.
3. Evaluate the geographical source of the material, and the composition of the dredged material from that source, and the alternatives for that dredged material.
4. Re-evaluate the costings of the various disposal options to assist the DMC understand the cost implications of each alternative use or disposal mechanism available to the applicant.

Kieran Murray Response

I consider the Market Economics report directly responds to the questions raised in my report for the DMC, *Review of economic analysis submitted in support of Coastal Resources Limited marine dumping consent application*, dated 1 November 2018.

<p>2. Approaches and Methodologies applied;</p>	<p><u>ME Report</u></p> <p>The ME report contains two broad areas of assessment;</p> <ol style="list-style-type: none"> 1. Current and future demand for dredging from Auckland marinas, wider Hauraki Gulf marinas including Marsden Point and Whangarei and the port of Auckland 2. Costing of a range of disposal and re-use options for the spoil – including dumping at the NDA, land disposal and reuse via reclamation. <p><u>Demand:</u> Demand for dredging has been broken into 2 components, capital dredging (representing new marinas or new port facilities) and maintenance dredging (representing the ongoing dredging required to keep marinas and the port at a safe navigable depth).</p> <p>Costings of Disposal: These are calculated based on identification of the volume to be disposed, multiplied by the cost to deposit at various disposal options – including the NDA, and land based sites. The process isolates volume by extraction location and distance to the most likely disposal facility as well as transport costs and any processing/drying costs likely to be incurred prior to disposal. The resulting figures are then able to be compared to assess the costs of alternative disposal options.</p> <p><u>Kieran Murray Response</u></p> <p>I consider the overall approach/methodology applied in the Market Economics report sound and fit for purpose – this comment applies both to the approach to estimating the cost of alternatives and the approach used to model future demand for dredging. However, I disagree with several key assumptions adopted by Market Economics; the assumptions I consider more plausible would materially reduce the forecast demand for disposal of dredging material at the Northern Disposal Area.</p>
<p>3. Assessment of Alternative Disposal Options;</p>	<p><u>ME Report</u></p> <p>The assessment includes costed options by location for 4 key alternatives to disposing marine dredgings at the NDA.</p> <p><u>Kieran Murray Response</u></p> <p>I consider that the alternative disposal methods should also include using the material for clean fill (as opposed to landfill) as disposing as clean fill, where available, tends to be a lower cost option than landfill. For example, Urbanquarry, 30 km from Pine Harbour marina advised me that will take (uncontaminated) wet dredged material and quoted \$35 a tonne and can take in excess of 20,000 tonnes a year. Earthquip, located about 20km from Hobsonville would take dried dredge material at \$115 per 6 wheeler (i.e., under \$20 a tonne). Marina’s further afield from Auckland may have access to lower rates.¹</p> <p>Reclamation, if available, (labelled as ‘cement mixing and reuse’ in M.E report) would avoid the cost of acquiring and trucking in fill from alternative sources to undertake the reclamation. These avoided costs are a component of the cost of disposing of dredged material, resulting in a lower total cost. I agree with M.E that future reclamation is unlikely within Auckland for the reasons identified by M. E. However, reclamation seems an option in some limited circumstances outside of Auckland – the consent application by the Whangarei Harbour Marina Management Trust for an additional 115 – 130 berths explains that the dredged material (capital and maintenance) will be used for reclamation and excess taken to an existing land site.</p> <p><u>Greg Akehurst Response</u></p>

¹ Mahurangi River Trust reported low end cost of \$40/cubic metre for extraction transport, dewatering and placement – see K Murray, 1 November 2018.

I agree that there is currently a range of other deposition to land options including being used as clean fill that are utilised by some marina's within the study area. Kieran Murray points out the Whangarei Marina is currently disposing to land and has identified 2 locations in Auckland that have stated they will take dredgings as clean fill. My understanding is that Urbanquarry is a transfer station in Onehunga that also sells aggregate, and that other options (\$35/tonne or around \$50/m³) are likely to require the material to either be dried or to have cement added to make the spoil 'spadable'. This adds approximately \$115/m³ to the costs. Assuming that the transport costs are offset by avoided other transport costs, this option works out at around \$150/m³.

Agreed cost range for disposal options

Disposal Options	Min	Max	Average
Dry and landfill	\$256	\$325	\$290
Cement mix and landfill	\$245	\$291	\$256
Land dry and cleanfill	\$143	\$301	\$192
Cement mix and cleanfill	\$101	\$147	\$112
Wet cleanfill	\$95	\$157	\$110
Cement mix and re-use (partial costs) ² , less avoid trucking costs	\$17	\$55	\$45
Northern Disposal Area	\$34	\$52	\$47

Agreed conclusion

Greg Akehurst and Kieran Murray agree that alternative disposal options for the bulk of dredged material that would otherwise be disposed of at the Northern Disposal Area would cost significantly more than the current cost of disposing material at the Northern Disposal Area.

ME Report

The assessment of costs of disposal alternatives assumes that the applicant is acting on behalf of the wider community – in particular the marina owners and operators, and Ports of Auckland and others.

Kieran Murray Response

The M.E report states that "the substantive differences in cost between the [disposal] options means that the sediment is unable to be disposed of in an alternative way (to the NDA) without a much larger cost to the applicant." As written, this comment is not correct. The applicant would not incur the larger costs of alternative disposal options, as the applicant, CRL, does not use or operate marinas nor undertake dredging.

Greg Akehurst Response

I agree that any costs of disposal are not "*imposed on the applicant*" as the applicant is neither an owner of a marina nor an owner of the barging company that carries out the dumping at the NDA. A more appropriate conclusion is that "the substantive differences in cost between the [disposal] options means that the sediment is unable to be disposed of in an alternative way (to

² M.E consulting, 27 November 2018, table 4, page 8

	the NDA) without a much larger cost to the user”.												
<p>4. Demand for Sediment Disposal - Marinas;</p>	<p><u>ME Report</u></p> <p>Demand for future marina dredgings is based on comparing the allocated and consented marina areas – as identified in the Auckland Unitary Plan along with other consented marina developments in the wider Auckland and Hauraki Gulf environment – with a population based assessment of demand for marina berths (holding boat ownership rates to increase only slightly 0.2% annually – approximately half the recent rate).</p> <p>New space is translated into a volume of dredged spoil by assuming an average dredging depth of 2.5m below chart datum (as advised by Marina developers).</p> <p><u>Kieran Murray Response</u></p> <p>I disagree with several key assumptions used by Market Economics to estimate future demand for dredged material from marinas. The assumptions I consider more plausible would materially reduce the forecast demand from these sources.</p> <p><u>Population based assessment of demand for marina berths</u></p> <p>The forecast project of future demand for marina berths is used by M.E as a check that its estimates of capital dredging are reasonable (ie., the capital dredging would provide sufficient berths to meet the project demand).</p> <p>M.E state that a report by BECA (2012)³ estimates that the rate of household boat ownership is projected to increase by 0.4% per year over the long-term from 2011 to 2031, and that M.E has conservatively adopted a 0.2% annual increase in the rate of boat ownership over the medium-term (M.E report, page 11). This is a misreading of the BECA study. This is a misreading of the BECA study. The 0.4% growth figure referred to by M.E relates to all forms of boats, and includes a 33% growth per annum in water skis and strong growth in dinghies and windsurf boards, etc.</p> <p>BECA projected a <i>decrease</i> in household ownership of yachts and launches (the relevant category for marina demand) as follows:</p> <p>Yachts and launches per household (BECA, 2012, page 32)</p> <table border="1" data-bbox="459 1375 1299 1615"> <thead> <tr> <th></th> <th>2011</th> <th>2031</th> </tr> </thead> <tbody> <tr> <td>Households</td> <td>515,600</td> <td>723,000</td> </tr> <tr> <td>Yachts and launches</td> <td>11,000</td> <td>12,000</td> </tr> <tr> <td>% of households owning yachts and launches</td> <td>2.13%</td> <td>1.66%</td> </tr> </tbody> </table> <p>Note: BECA projections were for total yacht and launches in Auckland region, including those on swing moorings, etc</p> <p>A decrease in the proportion of households owning a yacht or launch is consistent with immigration driving population growth (with a lower propensity for boat ownership).</p> <p>The BECA report projected an increase in yachts and launches over 20 years from 2011 to 2031 of 1,000 vessels, an average of 50 per year. A more recent NZ Marine Industry Association (2014) forecast cited by Comer (2018) predicted 100 launches and yachts per year. Note, M.E project increase of 2,300 over 10 years, and average of 230 per year.</p>		2011	2031	Households	515,600	723,000	Yachts and launches	11,000	12,000	% of households owning yachts and launches	2.13%	1.66%
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³ Beca, 2012 *Auckland Recreational Boating Study*, prepared for Auckland Council, 12 April 2012

M.E make no adjustment for committed additions to marina capacity. Additional marina berths since the BECA report have kept pace with those BECA projections:⁴

Approximate year	2014	2016	Committed	
Location	Pier Y Westhaven	Sandspit	Putiki Bay	Westhaven (replacing underutilized piles)
No berths	73	131	186	117 total, net 41 (poles were 63% utilized ⁵)

There is high demand for berths close to central Auckland. Westhaven has a waiting list. A telephone poll of marinas in the Auckland area indicates Orakei is full, but marinas further from the central city have some berths available – the further from the Auckland typically the greater the availability (but all marinas have high levels of utilization).

The M.E assumption of all marinas being full to capacity, a latent demand of 680 berths, and projection of an additional 2,300 berths required within 10 years is not supported by the documents cited by M.E. To illustrate, the following table takes the BECA projection, adjusts it for the berth additions shown above, and an assumption of 2% availability of existing marinas across the region (ie., 98% utilization):

BECA 2011 – 2031 increase in yachts and launches	1,000
<i>Less</i>	
Additional berths since 2011	431
Assumed 2% availability (6,800 x 2%)	136
Net additional berths required to 2031	433

If BECA were wrong, and proportion of households owning yachts and launches remained constant (or increased) then the forecast demand for marina berths would be closer to the M.E projection. Neither M.E nor I have located a more recent projection than the BECA study (the Comer report referred to by M.E relies on the BECA projections). There is therefore a high degree of uncertainty as to future demand for marina berths. In my view, this uncertainty is best modelled as a range, with the M.E forecast at the higher end of the reasonable range.

Greg Akehurst Response

Demand forecasts take into account the current shortage of marina berths in Auckland by assuming that there is a 10% latent demand. This has been supplemented (following caucusing with Kieran Murray) by assessing a 5% latent demand in response to Kieran's concerns that the value was high.

Recent reports from a range of sources including; Panuku Development Auckland (April 2018), International Boating Industry (November 2018) point out significant signs of supply shortfalls including very high marina lease and purchase prices, unavailability of long term leases, rapid

⁴ This list is not comprehensive and includes only those additions the subject of recent publicity. In addition to those confirmed above, the Whangarei Harbour Marina Management Trust has sought resource consent for an additional 115 – 130 berths.

	<p>price increases (including a doubling in the last year and 3 year waiting lists for inner city marinas⁶). I believe our estimate of latent demand is appropriate and sufficiently conservative for the purposes of this assessment.</p> <p>I do not consider the earlier Beca projections form an appropriate estimate of future marina demand. The Beca marina berth projections would require an annual average decrease of -1.9% in the rate of marina berth ownership among boat-owning households – when compared to projected population growth, this would equate to around a 32% reduction in the rate at which households own boats moored at marinas. This appears to be at odds with other key aspects of the report being that: past rates of marina growth have exceed population growth rates; a continued increase in the rate of boat ownership among households; and a trend towards ownership of larger boats. The report only provides some brief discussion of changes to the structure of boat ownership, but does not substantiate this with any analysis or consideration of the required changes to the rate of marina berth demand among households, which would be required to be substantial if the projections were to hold true.</p> <p>Instead, we have assumed a more conservative continuation of demand growth for marina berths. This is primarily driven by projected household growth in Auckland, with a small allowance made for the growth in boat ownership rates. I consider this growth in the rate of marina berths relative to households to be small at 0.2%pa when compared to past rates of 1.7%pa and future projections of 0.4%pa in the Beca report (acknowledging that these do apply to all boats).</p> <p><u>ME Report</u></p> <p>The ME report does assume that all new marina demand will be met by dredging. We have made no allowance for new marinas that don't require any dredging.</p> <p><u>Kieran Murray Response</u></p> <p>Demand for berths would need to be met by dredging</p> <p>M.E assume that the creation of new marina berths would be achieved by dredging to an average depth of 2.5 metres. However, marinas can be created without dredging – for example, the new Putiki Bay marina will be built without any dredging.</p> <p>M.E estimates capital dredging from existing marinas as follows:</p>
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⁶ "Auckland faces serious marina berth shortage", International Boating Industry, November 13th 2018, David Robinson.

Maximum area available for expansion (less any areas lost) x 2.5m³ = capital dredging volume

The table below compares the M.E modelled result with the CRL prediction:

Marina	CRL stated capital dredging m ³	ME modelled capital dredging	Difference	%
Half Moon Bay/ Bucklands Beach	40,000	92,000	52,000	130%
Hobsonville	350,000	400,000	50,000	14%
Pine Harbour	100,000	169,000	69,000	69%
Gulf Harbour (not in CRL estimate)		32,000		
Hobsonville point	214,900	105,000	- 109,900	-51%

M.E conclude that the CRL projections are within a reasonable range and adopt the CRL's estimates. In caucusing, explained that its model over estimated capital dredging from existing marinas because the incremental volume dredged would be less than its assumed average for a marina of 2.5m³.

This reasoning implies that the existing marinas developed the most costly marina berths first (ie those that needed the greatest amount of dredging), which is not the typical assumption for modelling commercial behaviour. If the remaining areas to develop were the more costly options (ie, marinas were developing from least to most costly options), then the dredging depth for those options might be expected to exceed the average of 2.5m, along with other higher costs.

The implication would be that:

- The inherent assumption in the capital dredging modelling that existing marinas will exhaust all possible options in next few years is too strong and hence the number of assumed berths to be created by existing marinas is too many (total demand for berths is less than M.E models) – my reading of the evidence is that with the exception of Hobsonville Point, none of the capital dredging adopted by CRL has been consented (the volumes assumed for maintenance would equal or exceed existing consented volumes), suggesting an absence of firm plans to expand at the scale modelled by ME.
- There is some support for the CRL view that other marinas will be developed – because they would be needed to meet (the reduced) demand and it might be reasonable to think that the average cost of a berth at an entirely new marina will be less than the incremental cost (most costly) additional berth at existing marinas
- The maintenance dredging modelled by CRL is too high because the marinas are unlikely to be developed to the maximum any time soon.

Hobsonville Point is a different case because the dredging is undertaken for purposes in addition to the marina (e.g., the wet edge, other facilities for the multi purpose development) and ME estimates also don't seem to have accounted for the 30,000 cm³ already dredged under the consent.

Greg Akehurst response

It is true that future marina demand could be met by not dredging, however, the known future marina developments upon which the estimates in my report are based are all dredged marina's. The intent of the analysis was to determine whether the capacity enabled by the dredged marinas was less than or exceeded the capacity required to meet demand M.E have estimated the additional capacity that would be generated by the future capital dredging works

on marinas. The key steps are set out below:

1. Advice was sought on the average digging depth across the whole area to develop a new marina. This was advised as an average of 2.5m.
2. The spatial areas of marina expansion were identified from the aerial photographs in comparison to the zoned areas of the AUP.
3. The additional/new area was multiplied by 2.5m to obtain an estimate of volume if the area were to be dredged at this average rate (of 2.5m).
4. This volume was then compared to the consented volumes for marina capital works. The purpose of this was to provide an upper limit check to make sure that the consented volumes we were provided with were within a plausible range relative to the areas that they applied to. If the volumes that were calculated were well below the consented volume, then that would indicate that the consented volume may be significantly too high. If this was the case, then further information was sought to understand why this was much higher and whether or not a lower value should be used. Put simply, it was used as a filter step in the process to check the scale of the volumes.
5. In most cases, the consented volumes were below the rate of the calculations (where an average of 2.5m was applied). This was expected because many of the volumes related to areas of expansion, which consequently would require a level of dredging less than 2.5m as marina expansion typically occurs outward from the marina edges where the water is already deeper. The 2.5m average takes into account the much higher dredging volumes required along the parts of the marinas closer to the shore where the water depths are lower.
6. The consented volumes (where they were appropriate) were then used within the demand estimates (rather than the modelled results at 2.5m). As an example, the total Half Moon Bay dredging volume was calculated to be around 92,000m³ based on the average dredging depth. This is an area of marina expansion. The consented volume was 40,000. Because the 92k was more than the 40k it was apparent that the 40k must be assuming a much lower dredging depth (i.e. 1.1m) (because the areas were known from the zoning maps). Because of this, the 40,000m³ were then use in the demand estimates.

I consider that that the economic theory outlined by Mr Murray (where the first units produced in an operation are typically the cheapest, with subsequent units gradually costing more through time) does not align with the practical development of a marina. This is because this pattern of costs does not concord with marina development given the typical cross-sectional pattern of chart datum relative to marina area – i.e. water depth is usually shallowest closer to the shore, and then becomes greater as you move away from the shore. Given this shoreline profile, for this pattern of cheapest first to hold true, the marina would need to be developed out in the deepest water away from the shoreline first, with future expansions gradually bringing the marina closer to the shore. I consider this does not reflect how marinas are developed and have not managed to find any examples where marinas have developed in this way.

We have instead assumed that marinas are usually developed closest to the shoreline first, and then expanded outward into deeper areas through time. Correspondingly this means that less dredging per berth has been assumed to be required for subsequent expansions. I am satisfied this is the case with the consented volumes for expansion, as outlined in my assessment process above.

It may be that marina construction cost and subsequent spatial expansion through time

align with the economic theory provided by Mr Murray when considering the relative share of dredging in marina development. It is important to be aware that dredging is one sub-component of marina development, with other costs relating to the provision of the marina infrastructure.

Given the lower rates of dredging assumed to produce additional berths, I am unclear as to how we may have over-stated the estimates of additional berths enabled by the future capital dredging volumes (based on the issue of different digging depths).

We have sought further specific information to re-check the consented volumes again to make sure that the correct parameters are being used in relation to how these volumes translate to surface area and number of berths. It was identified that some of the consented volumes for the new marinas include allowance for channel dredging. This means the previous estimates of surface area of these marinas (where AUP information was not available) had been over-stated. Because of this, the number of berths that they produced had also correspondingly been over-stated.

Further re-modelling of capacity projections has also taken place by using a lower average surface area per berth (as suggested by Mr Murray).

The following table provides an updated summary of the modelled marina berth capacity produced by the capital dredging volumes. In summary, the capital dredging volumes are estimated to produce a capacity of 2,040 berths. This compares to the previous estimate of 2,170 berths.

Marina	Previous Estimate	New Estimate
Half Moon Bay/Bucklands Beach	90	90.00
Hobsonville	740	740
Pine Harbour	310	310
Hobsonville Point	140	165
Coromandel	130	140
Tonkin Taylor	400	275
Confidential - Auckland	330	300
Whitianga	30	30
TOTAL	2170	2,040

These estimates of capacity have not been used to inform our projections of demand. The demand projections are constructed based on a separate process. The estimated capacity (supply) has then been compared to the projected demand to determine whether the volumes sought are within what I consider to be a reasonable range.

ME Report

The ME report quantifies the volume of dredged material likely to be able to be deposited at the NDA. This includes all dredgings from Auckland and surrounding marinas, the Port of Auckland and other capital dredgings (known), including for the America's Cup bases.

Kieran Murray Response

All dredged material would be disposed by NDA

The modelling assumes that all material dredged from all marinas in the region would be disposed at the NDA. The Whangarei marina current disposes of dredged material to land, and the resource consent sought by the Whangarei Harbour Marina Management Trust to expand the marina seeks permission to dispose of the capital and maintenance dredging to the same land site.⁸ M.E assumes dredged material from Whangarei will be disposed at the NDA.

Greg Akehurst response

The EPA's DMC have specifically asked me to estimate;

What is the current and potential demand for disposal of dredged material from sites in Auckland and the outer areas not in the inner Hauraki Gulf (e.g. the Coromandel, Firth of Thames, Great Barrier Island and Marsden Point) and disposal options other than the NDA, including on land?⁹

Therefore it is important to assess the full amount of potential spoil and cost it as though it was to be dumped at the NDA (and via the other land based options assessed).

On this basis, I have included a small allowance for maintenance dredging at the Whangarei Marina (approx. 7,200m³ total over ten years). This equates to approximately 0.3% of the demand projected for sediment disposal across this period.

ME Report

There are 3 marinas for which we have not been able to gain any additional information other than the volume of dredgings that the marina developers anticipate will be required. They have been termed "Coromandel, Tonkin and Taylor and Confidential – Auckland".

Kieran Murray Response

I have no basis for assessing the forecast demand from 'Coromandel, Tonkin Taylor, Confidential Auckland (table 7 of Market Economics Report) as these quantities are simply stated without any supporting reasoning. As noted above, M.E modelling of existing marinas plus additional marinas is consistent with an assumption that the proportion of Auckland households owning yacht and launches increases over time. My view is that this assumption is too strong and results in projections at the high end of a possible range.

Greg Akehurst Response

Once the volumes were translated into an expected number of berths and aligned with the rest of the current and future Auckland market, they aligned well with expected demand growth. Therefore, they have been taken as read.

ME Report

My assessment includes a 7% contingency value. There is no supporting assessment that covers this amount. The value has been provided to me by the applicant, based on their understanding of the way in which the market is expected to operate

Kieran Murray Response

I do not consider the 'contingency' estimates are supported by the analysis in the report; it just adds an increment to projects that are already at the high end of reasonable ranges

⁸ <http://wdc.govt.nz/NewsRoom/PublicNotices/Pages/Whangarei-Harbour-Marina-Management-Trust.aspx>

⁹ EPA letter (Richard Johnson, Manager EEZ Applications) to Applicant (Simon Male) dated November 16 2018.

Greg Akehurst Response

By its nature, a contingency amount is just that – an amount included to account for contingencies.

ME Report

The ME report assumes that demand growth is based on population growth and ownership rates. It does not respond to price changes. Therefore the effect of a significant increase in dredging price has not been translated into a corresponding reduction in demand.

Kieran Murray response

I disagree with the price/cost inelastic response of demand for marina dredging implied by the Market Economics analysis.

M.E predict a substantial increase in maintenance and capital dredging at existing marinas with only a relatively small increase in the number of additional berths. For example, M.E predict maintenance dredging at the CRL serviced marinas would increase from the recent average of 17,498m³ to 59,330m³, a multiple of 3.4. At the existing NDA rate of about \$50 m³, that represents an increase in costs to marina users from about \$900,000 per annum to \$2.9 million. The projected capital dredging would be additional cost. Capital dredging would cost a further \$3.5m per annum. Yet the number of berths in those marinas would increase by just 23% (table 6, 1,350/5,805 = 25%). Hence marina berth owners would face substantial increase in fees. M.E modelling assume that there would be no demand response to that substantial price increase, a position not supportable in economics.

The evidence by Shearer is that:¹⁰

“a key factor preventing dredging to these [consented] maximums has been the ability of berth holders to fund this level of dredging and subsequent dumping at the disposal sites. As sedimentation issues worsen I consider it is inevitable that these maximums will be required in the medium term.

Greg Akehurst response

M.E have undertaken further modelling to produce an alternative scenario to future marina berth demand. These are set out as follows:

We have instead assumed a latent demand of 5% (previously, 10%).

We have done further investigation on the number of marina berths in the study area and realised that there were a few places that were under-counted. In total, across the study area, we have identified approximately 7,200 berths existing across the wider area (including also the ones you identified in Waiheke as they have already been committed).

The combination of these factors brings the total demand for 2029 to approximately 9,400 berths.

M.E have also undertaken further modelling to estimate any effect on future demand for marina berths based on any increases in price from higher future rates of dredging.

When making this assessment, it is important to consider the following factors:

1. These changes in cost when considered in relation to the overall annual cost of boat ownership.
2. A disaggregated analysis where cost changes are considered within the segment of the market where they occur rather than assumed to occur across all marinas.

¹⁰ Mr Shearer, paragraph 13, op cit.

3. As cost changes apply only to a sub-set of marinas, whether there is any scope of adjustment within the market.

When analysed on an individual marina basis, only two marinas are estimated to have any significant change in maintenance dredging (Hobsonville and Pine Harbour) (see table below). Therefore, any effect on demand will be limited to these two marinas.

The overall annual increase in dredging across all marinas is largely driven by a combination of the expansion of existing marinas and the construction of new marinas. As such, the above calculations by Mr Murray (of the total cost increases relative to increases in new berths) do not provide a consistent comparison of the increase in dredging costs relative to new berth capacity.

Marina	Past Rate	Future Rate	Notes
Half Moon Bay/Bucklands Beach	0.01	0.01	
Hobsonville	0.04	0.12	
Pine Harbour	0.06	0.08	
Hobsonville Point	0.08	0.12	New marina - no past rates.
Coromandel	0.04	0.04	New marina - no past rates.
Tonkin Taylor	0.04	0.04	New marina - no past rates.
Confidential - Auckland	0.04	0.04	New marina - no past rates.
Bayswater	0.03	0.03	Full data not available for past rates.
Sandspit Marina	0.10	0.10	New marina. Past dredging captured in higher capital dredging.
Whitianga	0.07	0.07	
AVERAGE	0.04	-	

We have estimated the % change in berth costs for those marinas based on the % changes in dredging costs (assuming these flow through on a proportional basis and have assumed no scale economies to be conservative), outlined in the table below. We have then estimated this in relation to the overall change in boat ownership costs (as berth ownership costs are one component of annual boat costs). We have then estimated the % shift at the margin in terms of effect on boat owners. This is based off the best information on elasticities we could find.

We have then applied this change at those marinas to both the total existing boat owner population as well as the future growth rather than only the future growth, as it would have an effect on existing occupiers. We have then subtracted these numbers from the existing and future capacity totals for those marinas. We have then removed this number from the total future demand figure, to reach a re-estimated demand of approximately 9,100. This is above the original figure of 7,500 berths based on a re-basing of demand through a more complete picture of the existing market).

The corresponding demand growth figure (around 1,920-1,950 berths) has assumed that all of this effect is entirely a net loss and that none of it is a transfer effect. We consider that the bulk of this effect is actually likely to be a transfer effect given the ability for the market to adjust spatially across different marinas.

Consequently, we consider that our initial demand estimates provide the most likely picture of future marina berth demand. At around 2,100 additional berths, these estimates fall within the range of the lower estimate of demand of +1,920 berths (assuming a total net loss from price changes) and a new upper range of +2,200 berths (due to re-basing of original estimates from a more comprehensive picture of the existing market).

	Corresponding drop in berth basis						
	% Change in Maintenance Dredging Rate	% change in berth costs	% Change in annual boat ownership costs	Assumed Reduction in Demand	Existing	Capacity	
Marina							
Hobsonville	202%	181%	21%	14%	107	132	
Pine Harbour	27%	111%	3%	10%	14	8	
Hobsonville Point	50%	120%	5%	13%	-	7	
TOTAL					120	148	
	<p><u>ME Report</u></p> <p>The ME report assumes that the capital dredgings occur as outlined in Table 10 (page 17). Maintenance dredging is ongoing for existing marina space, but begins following the development year for new marina spaces.</p> <p><u>Kieran Murray Response</u></p> <p>I disagree with the time-profile assumed by Market Economics for the take up of disposing additional dredging material at the Northern Disposal Area.</p> <p><u>Greg Akehurst response</u></p> <p>The modelling undertaken by M.E is based on the information supplied by CRL. An analysis of the timing of capital works corresponds approximately with the growth in demand for additional marina berths through time, including the provision of capacity to meet latent demand.</p>						
5. Demand for Sediment Disposal – Ports of Auckland and AC36	<p><u>ME Report</u></p> <p>The ME report adopts the figures identified by Kieran Murray in the November 1st report at 38,000 /annum. This volume is relatively stable and is assumed to continue into the future</p> <p><u>Kieran Murray Response</u></p> <p>I agree with Market Economics assessment of future dredging for the Ports of Auckland and for the America’s cup.</p> <p><u>Greg Akehurst response</u></p> <p>I agree with the use of 38,000m3 per annual for POAL maintenance dredging as outlined in Mr Murray’s review of the original economic report.</p>						

<p>6. Wider Transport Costs of Sediment Disposal</p>	<p><u>ME Report</u></p> <p>The ME Report assumes that the volume of dredging required for the America's Cup defence (AC36) is 70,000m³.</p> <p><u>Kieran Murray Response</u></p> <p>I agree with Market Economics assessment of the wider transport environmental costs of truck movements (though noting these would reduce proportionately with less demand from marinas)</p> <p><u>Greg Akehurst Response</u></p> <p>The re-modelling outlined above has reduced the surface area of several future marinas. The re-modelled truck movements and kilometres travelled are 0.6% lower than the previous report, with an estimated total truck movements of 132,200 and 8.2m to 11.8m truck kilometres travelled.</p>
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