**South African Association of Ship Operators and Agents**

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The Chairman
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04 November 2013

Dear Sir/Madam

**SAASOA SUBMISSION TO THE TRANSNET NATIONAL PORTS AUTHORITY PROPOSED TARIFF INCREASE FOR YEAR 2014/2015.**

## FOREWORD

The South African Association of Ship Operators and Agents ("SAASOA") a Section 21 Association was formed amongst other objectives to collaborate with its members in their efforts towards the continuous improvement of shipping standards for the mutual benefit of all stakeholders, and to be an active participant in the development and maintenance of world class Ports in South Africa.

It is against this background that SAASOA embraced the opportunity to provide a written submission, compiled by a financial economist based on the Methodology used in the Transnet National Ports Authority ("TNPA") tariff calculation.

# 1 INTRODUCTION

The TNPA has requested a tariff increase of 8.5%, on the basis that its required maritime revenue for the 2014/15 financial year is R8 380m.

It arrives at this estimate using the Revenue Requirement (RR) approach prescribed by the Regulator in its Regulatory Manual.

The RR formula is as follows:

*Revenue Requirement (RR) =*
*Regulatory Asset Base (RAB) x Weighted Average Cost of Capital (WACC)*
*+ Operating Costs (OPEX) + Depreciation (DEPR) + Taxation expense (TAX)*
*- (+) Claw back + (-) Excessive Tariff Increase Margin Credit (ETIMC)*

The TNPA's basis for determining its RR for 2014/15 is as follows, where Return on Capital (ROC), is equal to RAB x WACC:

| | 2014/15 (Rm) |
|---|---|
| ROC | 3772 |
| +DEPR | 1671 |
| +OPEX | 4329 |
| +TAX | 1057 |
| CLAWBACK | 118 |
| ETIMC | -454 |
| REAL ESTATE | -2113 |
| | |
| RAB | 64694 |
| WACC | 5.83% |
| | |
| RR | 8380 |

# 2 HISTORICAL COMPARISON AND ANALYSIS

Before proceeding to analyse the TNPA's calculations for the 2014/15 financial year in more detail, it is worth briefly comparing these calculations to its applications for the 2012/13 and 2013/14 financial years in conjunction with the Regulator's decisions on the RR for the said years (the acronym ROD denotes reference to the Regulator's Record of Decision for the financial year in question).

**TABLE A:**
**Comparison of past TNPA tariff applications and Regulator RODs**

| | 2012/13 APP | 2012/13 ROD | 2013/14 APP | 2013/14 ROD | 2014/15 APP |
|---|---|---|---|---|---|
| ROC | 5245 | 3675 | 5525 | 3272 | 3772 |
| +DEPR | 1130 | 1330 | 1659 | 1570 | 1671 |
| +OPEX | 2981 | 2986 | 3953 | 3876 | 4329 |
| +TAX | 786 | 342 | 1242 | 959 | 1057 |
| CLAWBACK | -497 | -1440 | -1402 | -1218 | 118 |
| ETIMC | 0 | 900 | 0 | 1378 | -454 |
| REAL ESTATE | 0 | -1643 | -1856 | -1856 | -2113 |
| RAB | 58490 | 60001 | 66315 | 62803 | 64694 |
| WACC | 8.97% | 6.13% | 8.33% | 5.21% | 5.83% |
| RR | 9645 | 6150 | 9121 | 7981 | 8380 |

## 2.1 THE COST OF CAPITAL

Firstly, it is noteworthy that the TNPA, in electing to follow the Regulator's guidelines in the regulatory manual when determining ROC, has been obliged to abandon its past approach of determining an excessively high WACC and including excessive capital returns in its RR calculations.

However, it must be noted that the TNPA's adoption of the methodology set out in the Regulatory Manual is on the understanding that its position paper, on which its calculations for the 2013/14 application were based, remains under review. In particular, the choice of beta advocated in the position paper, namely that of the Top 40 Companies Index, would lead to a significant increase in the WACC and the ROC. While this aspect of the position paper is not in issue in this year's application, we feel the need to reiterate our objection to the beta estimation approach advocated in the position paper and to this end have included an extract from our comments on the 2013/14 tariff application as Appendix A. We reiterate our support for the use of an ICAPM model in estimating the TNPA's cost of equity.

## 2.2 INCREASES IN OPEX

A second noteworthy feature of Table B is the increasing role played by operating expenses (OPEX) in the RR. The OPEX estimate applied by the TNPA for 2014/15 is R4 329m, which is an increase of approximately 45% on the estimate for the 2012/13 application (R2 981m) and the amount allowed in

the 2012/13 ROD (R2 986m). A 45% increase over two years translates to an annualized increase of 20.4%! Furthermore, the OPEX estimate for 2014/15 represents a year-on-year increase of 11.7% over the allowed OPEX per the 2013/14 ROD.

This illustrates a shortcoming of the RR approach to regulation of monopolies, one that is shared in slightly different form, by the Rate of Return or ROR approach. In the ROR approach, the monopoly is limited to a specified maximum rate of return (ROR) (see Carlton and Perloff, 2000: 670-671). The formula for the ROR approach can be expressed as follows (in a world without taxes, for simplicity's sake):

*ROR = (Total Revenue – Operating Costs – Depreciation) / Capital Employed*

Under the RR approach, the effect of an increase in OPEX is simply to increase the RR. The increase in OPEX does not reduce profits, because profits are limited to the return on capital, RAB x WACC. Thus, a monopoly regulated under the RR approach has no incentive to reduce OPEX and indeed an incentive to increase it with a view to increasing its allowed revenue.

Under the ROR approach, once a limit on ROR has been set, the monopoly must still pay attention to its cost structure. Excessive OPEX could lower the rate of return below the limit allowed by the Regulator. However, this would free the monopoly to use its monopoly power to increase prices to boost its rate of return back up to the limit allowed by the Regulator. This is also an undesirable outcome.

A comparison of the two approaches clearly conveys, in our view, the need for the Regulator to closely scrutinise the increase in OPEX claimed by the TNPA. If OPEX is allowed to increase excessively and thereby increase RR, then this is tantamount to the Regulator allowing the TNPA to access its market power by subterfuge.

## 2.3 THE EFFECT OF THE CLAWBACK AND ETIMC

It is clear from the 2012/13 and 2013/14 RODs as well as the TNPA's 2014/15 application that the application of a claw back and of the ETIMC has the potential to considerably smooth the RR, and to a considerable degree, at the discretion of the Regulator.

This raises a question over the true extent of the risk faced by the TNPA, and in particular, by its creditors. The Regulator has acknowledged in its Regulatory Manual that the role of the claw back and ETIMC must be taken into account when determining the TNPA's asset beta, and that these offer some justification in its view for an asset beta of 0.5.

Notwithstanding that for the purposes of the calculations below, we accept an asset beta estimate of 0.5 (and further propose that the asset beta be estimated using the ICAPM), the question must be asked whether, with the effect of smoothing, the TNPA has any sensitivity to the performance of the market portfolio (whether domestic or international). It may be that the TNPA should be regarded as a zero beta asset.

At any rate, with the effect of smoothing, there must be considerable doubt as to whether there is any prospect of the TNPA ever defaulting on servicing its debt. The Regulator has approved as an estimate of the TNPA's cost of debt, the average embedded Transnet group cost of debt, which at 3.25% p.a. is 0.96% points higher than the risk-free rate of 2.29% p.a. By allowing the TNPA to share a cost of debt, that in our submission, is significantly higher than that justified by the risk it carries as a standalone operation, the Regulator is permitting the TNPA to subsidise the finance charges for the remainder of Transnet.

# 3 ANALYSIS OF THE RETURN ON CAPITAL (ROC) PROPOSAL

The TNPA has by and large prepared its estimate of the ROC with reference to the Regulatory Manual.

We confine our comments to three areas:

1. The choice of market risk premium.
2. The application of the Hamada model
3. The cost of debt

## 3.1 THE CHOICE OF MARKET RISK PREMIUM

In the Regulatory Manual, the Regulator has specified that the Dimson, Marsh and Staunton (DMS) estimate of the arithmetic mean MRP as measured against bonds for South Africa is to be used as the Market Risk Premium (MRP) in the TNPA cost of equity calculation. The TNPA has duly used this estimate, obtained from the Credit Suisse Global Investment Returns Source Book 2013, which is 7.1% p.a.

The traditional view is that when estimating a rate of return for a single period, the arithmetic mean MRP should be used to calculate the cost of equity, because this takes into account the full distribution of single-period results whereas the geometric mean does not (Buckley, 2000:458).

The formula for a sample arithmetic mean return is given by:

$r\_am = \Sigma_i (1 / T) r_i$, *for* $i = 1, ..., T$.

The formula for a sample geometric mean return is given by:

$r\_gm = [\Pi (1 + r_i)]^{1/T} - 1$, *for* $i = 1, ..., T$.

For both formulae, T denotes the time periods over which the mean is measured, while $r_i$ denotes the return in time period i.

The arithmetic mean return is simply the probability weighted expected return in any single period, where the probability of each discrete outcome is assigned an equal value. Equal weighting is given to positive and negative returns.

However, positive and negative returns of an equal magnitude do not have an equal effect on wealth. Consider two consecutive returns of +20% and -20% and a starting value for an asset of R1000. The arithmetic mean return is 0%. Applying this measure, one would expect the asset's value to be unchanged. However, an increase of 20% in the asset's value (to R1200) followed a by a drop of 20% leaves a final asset value of R960.

However, if the geometric mean return is estimated, $r\_gm = (1.2 \times 0.8)^{1/2} - 1 = 0.96^{1/2} - 1 = 0.9798 - 1 = -0.0202$ or -2.02%. This means that on average, each period, the asset's value dropped by 2.02%, which corresponds to a drop over two periods of R40. The arithmetic mean therefore overstates the multi-period change in wealth.

The geometric mean return identifies the rate of return that has to be earned in each period during a particular time interval, given a starting value for an asset, to achieve the asset's future value. In this sense, it captures the long-run average rate of return.

As the geometric mean captures the long-run average rate of return, it also takes into account the possibility of mean reversion in the future distribution of returns, something which is ignored by the arithmetic mean, which simply assumes that the historical distribution of returns will be repeated in the future.

While there has been considerable debate as to whether asset returns exhibit mean reversion, it is submitted that academic research (Fama and French (1988, 1992), Poterba and Summers (1988), Haugen (1999)) as well as recent experience (market performance during the 2000s) point to market correction and mean reversion. This would support the use of a geometric mean estimate of the MRP.

The TNPA is not a private enterprise, nor is it subject to competition. The rate of return it applies in determining its return on capital determines not only what its profit (using the term somewhat loosely) for the next period is expected to be, but also what its profit is allowed to be. In this context, it is submitted that on policy grounds, the arithmetic mean is an inappropriate measure for mean returns, because it focuses on the probable future single period outcome rather than a long-run estimate of the rate at which wealth is being created. In this regard it must be kept in mind that the Regulator considers the TNPA's assets to depreciate over a forty year period. That is to say, capital invested by the TNPA is expected to earn its return over a lengthy period.

It is therefore submitted that the real question faced by the Regulator is what tariff is consistent with the Port Authority earning an acceptable long-run rate of return on the capital invested. In the circumstances, it is submitted that geometric means are a more appropriate method for determining mean returns.

If the Regulator wishes to find regulatory support for this approach in South Africa, it need look no further than NERSA's record of decision for the MYPD3 tariff determination. As is apparent from paragraph 28 of the MYPD3 record of decision, a market risk premium of 5.3% is used. This is the geometric mean risk market premium for South Africa for the period 1900-2011 (see Credit Suisse Global Investment Returns Yearbook 2012, p51). There is, in our respectful submission, no valid reason for the Regulator to follow a different approach in relation to the TNPA.

The geometric mean MRP for the period 1900-2012 is 5.4% p.a. (Credit Suisse Global Investment Returns Yearbook 2013, p52)

However, there is a further consideration.

A more recent trend in research on the MRP, spearheaded by DMS no less, has been to estimate the future MRP with reference to geometric means of the dividend yield and growth in dividends (Dimson, Marsh and Staunton (2008; 2011); see also Grinold, Kroner and Siegel (2011) ("GKS")).

DMS and GKS decompose the historic average of the market return into three elements:

1. The average dividend yield
2. Nominal growth in dividends
3. Repricing (the change in the P/E multiple)

Both sets of authors suggest that in making a forward prediction of the market return, it is generally not warranted to assign a non-zero value to the pricing

component. This leaves the average dividend yield and nominal growth in dividends as the likely stable components in the future market return.

This echoes the Dividend Discount Model (DDM) approach to determining the cost of equity namely:

If per the DDM, $P_0 = D_1 / (K_e - g)$, where $P_0$ is the current price of a share, $D_1$ the dividend to be received in respect of that share, $K_e$ the cost of equity in relation to the share and g the forecast growth rate in dividends, then denoting the dividend yield $(D_1 / P_0)$ as $DY$:

$$K_e = (D_1 / P_0) + g = DY + g$$

It follows that the MRP can be determined from this method as:

$$R_m - R_f = DY_m + g_m - R_f$$

Where $R_m$ denotes the return on the market portfolio, $R_f$ the risk free rate, $DY_m$ the dividend yield on the market portfolio and $g_m$ the dividend growth rate for dividends on the market portfolio. Adjusting for inflation, we use the real values of $R_m$, $R_f$ and $g_m$.

In Dimson, Marsh and Staunton (2011), DMS provide the following estimates for the components of South Africa's real market return over the period 1900-2010:

1. Dividend yield (DY) = 5.82%
2. Real dividend growth rate = 0.95%
3. Repricing (increase in P/E ratio) = 0.46%

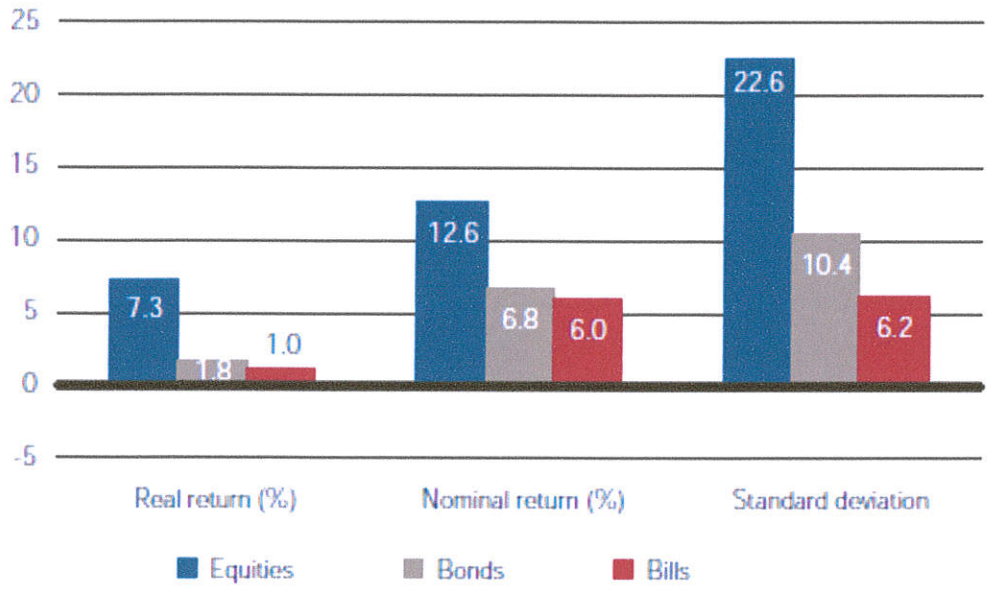
As these are geometric means, they must be combined as follows to obtain the geometric mean real market return for SA for the 1900-2010 period:

$$(1 + R_m) = (1 + 0.0582)(1 + 0.0095)(1 + 0.0046) = 1.073$$
$$R_m = 7.3\%$$

As can be seen of the attached extract from the Credit Suisse Global Investment Returns Yearbook for 2011 (Figure 3), the reconstituted return matches the observed geometric mean real market return for the 1900-2010 period.

Figure 3

## Returns and risk of major asset classes since 1900




Source: Elroy Dimson, Paul Marsh and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2011.

However, as was pointed out above, it is doubtful whether repricing should play a role in the forward looking estimate of the market return and MRP, as this would assume that the market is permanently mispriced.

Removing the repricing component from the mean market return results in:

$(1 + R_{m*}) = (1 + 0.0582)(1 + 0.0095) = 1.068$
$R_{m*} = 6.8\%$

The adjusted real estimate of MRP (MRP*) can then be obtained by differencing in geometric terms the adjusted market return estimate and the annualized mean real return on bonds for the period 1900-2010, which as depicted above is 1.8% p.a.:

$(1 + MRP^*) = (1 + R_{m*}) / (1 + 0.018) = (1 + 0.068) / (1.018) = 1.049$
$MRP^* = 4.9\%$

We therefore prepare estimates of the cost of equity using both the geometric mean MRP of 5.4% reported in the Credit Suisse Investment Returns Yearbook

and to the adjusted estimate of 4.9% derived above (regrettably, DMS do not appear to have updated their 2011 study for 2013).

## 3.2 THE APPLICATION OF THE HAMADA MODEL; THE COST OF DEBT

The Regulator has specified that the TNPA use an asset beta of 0.5, a gearing of 50% (that is, denoting Debt as *D* and Equity as *E*, *D / (D + E) = 50%* and hence *D / E = 1*) and the Hamada model to determine its levered beta, with a view to determining its cost of equity.

However, there are two versions of the Hamada model.

The first of these assumes that debt is risk-free and takes the following form:

$$\beta_e = \beta_a(1+(1-t)(D/E))$$

The appropriate form of the Hamada equation when an entity has risky debt is as follows (Ross et al, 1999: 449):

$$\beta_e = \beta_a + (\beta_a - \beta_d)(1-t)(D/E)$$

While we have suggested that TNPA's debt should be regarded as being risk-free for reasons set out above, the TNPA and the Regulator assume that the TNPA's debt is risky, allowing a cost of debt with a spread of 0.96% over the real risk-free.

However, the TNPA and the Regulator have incorrectly made use of the Hamada model for risk-free debt when levering the TNPA's beta, given the beta estimate of 0.86:[1]

*0.86 = 0.5(1 + (1-0.28))(1) = 0.5 x 1.72 = 0.86*

If, as we suggest, the TNPA's cost of debt should be the same as the real risk-free rate of 2.29%, then there can be no objection to the levered beta so calculated.

However, if the debt is risky, then $\beta_d > 0$, and as appears from the formula above, it would follow that $\beta_e < 0.86$, reducing the levered cost of equity.

[1] With a corporate tax rate (*t*) of 28%, *(1-t) = 1 – 0.28 = 0.72*

We present three alternative estimates of $\beta_e$, depending on whether the MRP is 7.1% as the TNPA suggests, or the geometric mean MRP of 5.4% or as we recommend, the adjusted geometric mean MRP* of 4.9%.

First we note that $k_d = r_f + \beta_d \times MRP$ and thus that the implied $\beta_d = (k_d - r_f) / MRP$.

As in real terms, $k_d = 3.25\%$ and $r_f = 2.29\%$, $k_d - r_f = 0.96\%$.

Then, if the MRP is:

- *7.1%, $\beta_d = 0.96\% / 7.1\% = 0.135$ and $\beta_e = 0.5 + (0.5\text{-}0.135)(0.72)(1) = 0.76$*
- *5.4%, $\beta_d = 0.96\% / 5.4\% = 0.178$ and $\beta_e = 0.5 + (0.5\text{-}0.178)(0.72)(1) = 0.73$*
- *4.9%, $\beta_d = 0.96\% / 4.9\% = 0.196$ and $\beta_e = 0.5 + (0.5\text{-}0.196)(0.72)(1) = 0.72$*

## 3.3 COMPUTING THE COST OF CAPITAL AND THE RETURN ON CAPITAL

It now falls to compute different alternatives for the cost of equity, the cost of capital and the return on capital in light of the above.

We identify six distinct cases based on our criticism of the approach followed by the TNPA and the Regulator:

I. Debt is risky, MRP is 7.1%

II. Debt is risky, MRP is 5.4%

III. Debt is risky, MRP is 4.9%

IV. Debt is risk-free, MRP is 7.1%

V. Debt is risk-free MRP is 5.4%

VI. Debt is risk-free MRP is 4.9%

**TABLE B:**
**Comparison of six alternative methods for the ROC calculation**

| CASE | I | II | III | IV | V | VI | EXPLANATION |
|---|---|---|---|---|---|---|---|
| Risk free debt | NO | NO | NO | YES | YES | YES | If debt is risk free, $K_d=R_f$ and $\beta_d=0$ |
| $K_d$ (real) | 3.25% | 3.25% | 3.25% | 2.29% | 2.29% | 2.29% | Given values |
| $R_f$ (real) | 2.29% | 2.29% | 2.29% | 2.29% | 2.29% | 2.29% | Given value |
| MRP | 7.10% | 5.40% | 4.90% | 7.10% | 5.40% | 4.90% | See 3.1 above |
| Gearing (g) | 50% | 50% | 50% | 50% | 50% | 50% | Given value |
| $\beta_d$ | 0.135 | 0.178 | 0.196 | 0.000 | 0.000 | 0.000 | See 3.2 |
| $\beta_e$ | 0.76 | 0.73 | 0.72 | 0.86 | 0.86 | 0.86 | See 3.2 |
| $K_e$ (real) | 7.69% | 6.23% | 5.82% | 8.40% | 6.93% | 6.50% | $K_e$ (real) = $R_f$ (real) + $\beta_e$ x MRP |
| WACC (real) | 5.47% | 4.74% | 4.53% | 5.34% | 4.61% | 4.40% | WACC (real) = $gK_d$ (real) + $(1-g)K_e$ (real) |
| RAB | 64694 | 64694 | 64694 | 64694 | 64694 | 64694 | Given value |
| ROC | 3537.468 | 3067.143 | 2933.226 | 3456.6 | 2983.687 | 2844.595 | ROC = WACC (real) x RAB |

It is noteworthy that the choice of an MRP based on the geometric mean significantly reduces the cost of equity and the WACC. Where debt is not treated as risk-free, the application of the correct form of the Hamada model also significantly reduces the cost of equity, WACC and ROC. Finally, if debt is treated as being risk-free, this leads to a relatively higher cost of equity (due to the higher value of the levered beta), but a lower WACC and ROC. All of the above estimates of ROC are lower than the TNPA's ROC estimate of R3 772m.

In the premises, we consider the estimate of ROC included in the TNPA's 2014/15 application to be excessive.

## 4 OPERATING EXPENSES

We have noted our concern over the significant increase in OPEX estimated by the TNPA. While we note the reasons given by the TNPA therefor, this does not alter the fact such increases will be passed on directly to the TNPA's customers by virtue of the RR approach and as we have pointed out, result in the TNPA accessing its market power, albeit indirectly, with the complicity of the

Regulator. Any business in a competitive environment must manage cost increases, including those arising from wage agreements and energy prices. It is not always possible for businesses in a competitive environment to pass these increases on to consumers and accordingly they must look at ways to reduce costs or suffer a reduction in profit. There is no prospect of the TNPA suffering a reduction in profit due to increased OPEX, unless the Regulator limits the increase in OPEX recognised in the RR, because in essence, the TNPA's allowed profit is determined independently of its OPEX, in the form of the ROC.

To this end, we suggest that the rate of increase in OPEX be capped at CPI plus 3% (to allow for increased activity), that is, a rate of 8.9% per the 5.9% CPI estimate used by the TNPA. This 8.9% increase must not be applied, however, to the TNPA's budgeted OPEX for 2013/14 (R4 190m), but rather to the OPEX allowed in the 2013/14 ROD (R3 876m), otherwise the purpose of regulatory control of OPEX would be defeated.

We therefore suggest that the NPA's OPEX for the 2014/15 financial year be limited to R4 221m (or 108.9% of R3 876m), a reduction of R108m on the TNPA's requested OPEX.

## 5 TAXATION

We note that the TNPA's taxation calculation on page 34 of the application ignores the tax implications of the clawback and the ETIMC. Both of these mechanism have the potential to either increase or decrease the TNPA's allowed revenue for the financial year. Accordingly, their application leads either to increased taxation or tax savings, as the case may be. The TNPA has simply determined its tax calculation as the tax applicable, at a rate of 28%, to its ROC.

## 6 THE ETIMC

The TNPA has suggested that its RR be decreased by R454m through the release of a portion of the ETIMC provision. This obviously would have the effect of reducing future reductions in the TNPA's RR (due to the reduction in the ETIMC provision). It is our view that, while it is desirable to minimise tariff increases, the TNPA has offered no cogent reason for releasing these funds from the ETIMC in the 2014/15 financial year. The TNPA's admission that R8380m in marine revenue is sufficient for its operations points not to a need to reduce the ETIMC, but to a need to place limits on the increases in the TNPA's ROC and OPEX.

The ETIMC exists in order to buffer consumers from substantial increases in the RR if and when the TNPA undertakes a significant expansion of its capital base (section 6.7 of the Regulatory Manual). The RAB calculation for the year points to an increase in CAPEX of R3 317m (tariff application, p31). Applying the TNPA's proposed WACC of 5.83% plus an annual user charge (namely, the depreciation rate of 2.5%) to this amount points to an increase in RR attributable to new CAPEX of only R276m,[2] or only 3.5% of the allowed RR for 2013/14 (R276m/R7981m) and less than the proposed amount to be released. The attributable increase to RR is further reduced if our view that the TNPA's proposed WACC is excessive is accepted.

Accordingly, we express the view that while the Regulator should not allow an RR as high as the TNPA's estimate, any reduction of the RR estimate should not be facilitated by reducing the ETIMC provision. The simple fact is that the TNPA's RR estimate is excessive, for the reasons we have given.

## 7 CONCLUSION

In this submission we have identified several areas of concern in the application and the Regulatory Manual. We have not sought to recommend a specific RR to the Regulator but have instead identified alternative calculations for components of the RR where we believe the application of methodology in the application and the Regulatory Manual is inappropriate or gives rise to new problems.

We trust that the Regulator will afford due consideration to these submissions when making his decision on the tariff increases, and in considering the contents of the multi-year proposal and position paper submitted by the TNPA in respect of the 2014/15 financial year.

Regards

Mr Peter Besnard
SAASOA CEO

[2] 3317 x (0.0583 + 0.025) = 276.3061

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**APPENDIX A:**

**EXTRACT FROM PREVIOUS YEAR'S SUBMISSION IN REGARD TO USE OF THE CAPM AND CHOICE OF CAPM BETA**

In terms of the standard CAPM model adopted by the Authority, the cost of equity is directly linked to the exposure of an asset to systematic or market risk within its domestic market. Systematic risk or market risk is risk that cannot be diversified away through the construction of a portfolio of assets – it is therefore the risk that is inherent in a particular financial market. By assumption, the domestic market portfolio, typically proxied by the index of the domestic stock exchange, is regarded as embodying the systematic risk present applicable to domestic firms. Accordingly, beta is measured as the covariance of the asset's returns with those of the market index, normalised by the variance of the latter (see Elton et al, 2011: 133, 282-8).

The Port Authority, being an unlisted entity, has experienced considerable difficulty in determining the appropriate beta to be used. In consequence, the Regulator has adopted an asset beta of 0.50, namely that used by the Queensland Competition Authority (QCA) for ports.

For its 2013/2014 proposal, the Port Authority has proposed the use of the beta of the JSE Top 40 Companies Index on the basis that the companies reflected in the index "are fairly active in the domestic, regional and international space and their exposures to market risk can be considered a fair reflection of global risk" while "[t]he Authority provides a platform for the South African market (import & export) to trade and complete globally with 98% of seaborne cargo moving through the port system."

With all due respect to the Port Authority, this suggestion is ludicrous. The companies comprising the Top 40 Companies Index are private enterprises that are obliged to compete with both domestic and foreign competitors. They must constantly strive to obtain competitive advantage if they are to remain viable. The Port Authority is a regulated monopoly operating in an industry for which demand is largely inelastic. While the Port Authority may be exposed to the same market risk factors as the companies making up the Top 40 Companies Index, there is no reason to believe and indeed considerable reason to doubt that it operations are as sensitive to these risk factors.

By proposing the use of the Top 40 Companies Index as a beta proxy it is noteworthy that the Port Authority arrives at an asset beta of 0.8907, considerably higher than the asset betas of 0.62 and 0.83 it proposed in its 2011/12 and 2012/13 tariff applications, respectively.

It must also be pointed out that the Top 40 Companies Index is closely correlated with the All Share Index, given that its constituents represent a substantial proportion of the total market capitalisation of the JSE.

If the price returns for the Top 40 index over the past 60 months (December 2007 to November 2012) are regressed on those for the All Share Index,[1] an estimated beta of 1.065 is obtained. Furthermore, over the past 60 months, the Top 40 Companies index has a mean monthly return of 1.23% with a standard deviation of 5.25% while the All Share Index has a mean monthly return of 1.27% with a standard deviation of 4.95%. In essence, then, the Port Authority, in seeking to adopt the Top 40 Companies Index as its beta proxy, is suggesting that it faces the same systematic risk structure as the South African equity market as a whole.

A more appropriate approach would be to estimate the betas of foreign comparator firms with reference to a common market portfolio, such as the world market portfolio, proxied by the MSCI World Index. Such an approach would imply adoption of what is known as the ICAPM model, which simply substitutes a world index for the domestic market index (the domestic risk-free rate is retained);

$$K_e = r_f + \beta(E[r_w] - r_f)$$

Given the increasing integration of international financial markets, including South Africa's, there is a strong case for using the ICAPM on the basis that the domestic CAPM does not fully take into account the opportunities for investors in domestic markets to take advantage of international portfolio diversification to diversify away domestic systematic risk, and accordingly offers an inefficient and excessive estimate of the cost of equity.

In the case of the Authority, due to its domestic monopoly, and the lack of domestic comparator firms, it is submitted that the ICAPM should be employed based on practical considerations.

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[1] Applying the commonly used market model approach to beta estimation i.e. $R_{it} = a + bR_{Mt} + e_{it}$.

To give a simple illustration of how the ICAPM might work as well as the difficulties in the approach adopted by the Port Authority, return data on the following indices was obtained from MSCI-BARRA for the 60 month period December 2007 to November 2012: Australian Infrastructure Index, Emerging Markets Infrastructure Index, the South Africa (Large and Mid Cap Index) and the World Index (Large and Midcap). The two infrastructure indices are proposed as (admittedly crude) proxies for the Port Authority, the South Africa index as a proxy for the Top 40 Companies Index while the World Index becomes the market index for use in the CAPM. Returns are measured in dollars.

Credit Suisse's Global Investment Returns Yearbook 2012 provides an estimate of the market risk premium for a proxy world portfolio of 3.5% per annum (measured in US dollars and based on the historical market risk premia of 19 countries, including South Africa, over the period 1900-2011) and reports that the historical average real return on bonds for the countries making up the proxy world portfolio is 1.7% per annum (also measured in US dollars). The latter figure is used as a proxy risk free rate.

Regressing the infrastructure and South African indices on the proxy world index,[2] the following betas and estimates of the real cost of equity (measured in US dollars) are obtained:

| | **AUSTRALIA INFRASTRUCTURE** | **EM INFRASTRUCTURE** | **SOUTH AFRICA** |
|---|---|---|---|
| Beta | 0.94 | 0.91 | 1.24 |
| MRP | 3.50% | 3.50% | 3.50% |
| Beta x MRP | 3.28% | 3.20% | 4.34% |
| Real Risk free rate | 1.70% | 1.70% | 1.70% |
| Real Cost of equity (USD) | 4.98% | 4.90% | 6.04% |

It is submitted that there is no reason why the Port Authority should not be able to apply an ICAPM model in estimating the cost of equity. Furthermore, the above estimates strongly suggest that the Port Authority's approach to determining beta leads to an excessive estimate of the cost of equity, given the nature of its operations.

[2] I.e. estimating the betas using a market model.

Accordingly, it is suggested that until such time as the Port Authority adopts an appropriate model for estimating the beta and is able to substantiate the validity of such model, the Regulator should continue to apply an asset beta of 0.50 in line with its recent decisions.