# TABLE OF CONTENTS

1. Executive Summary ........................................................................................................3

2. Relevant Development of ARTC’s 2011 Hunter Valley Access Undertaking.....7

3. Process for developing the initial Indicative Service ..............................................11

4. ARTC Proposal ..........................................................................................................25

5. Request for Stakeholder Comment.............................................................................26
1. Executive Summary

Background & Context: Relevant development of ARTC’s 2011 Hunter Valley Access Undertaking (2011 HVAU)

In June 2011, the 2011 HVAU lodged by ARTC was accepted by the ACCC. This followed previous versions in April 2009, September 2010 and April 2011 that were subject to a substantial level of consultation and ACCC review. As part of that consultation process a number of stakeholders advised that ARTC’s earlier proposals in relation to the development of the Indicative Service, being a service that ARTC considers will deliver optimum utilisation of Coal Chain Capacity given certain System Assumptions, were not timely.

ARTC’s understanding is that existing available coal chain modelling is not sufficiently developed in order to determine optimum utilisation of the coal chain as a whole, but has been largely designed to test certain train configurations against existing infrastructure constraints. In adopting such modelling to determine an Indicative Service there remains a risk that pricing signals will not fully support optimal utilisation of Coal Chain Capacity. ARTC considers that adopting pricing signals that do not provide incentive for optimal utilisation of the coal chain as a whole may not deliver efficient outcomes, contrary to the objectives of the Competition and Consumer Act 2010 (CCA).

In order to address the concerns of industry in this regard, and without limiting the development of the Indicative Service to an unrealistic and unachievable timeframe, ARTC has agreed to an industry proposal to adopt a two stage process. This process would result in the development and proposal of an initial Indicative Service, using existing Hunter Valley Coal Chain Coordinator (HVCCC) modelling and existing infrastructure constraints, and pricing within 5 months of the Commencement Date of the 2011 HVAU. This would be followed by the development and proposal of the Indicative Service, following development of more robust modelling enabling variation of System Assumptions, within 30 months of the Commencement Date of the 2011 HVAU.

In discussions with key stakeholders at the time, it was agreed that any specification of the initial Indicative Service, and pricing signals would:

1. be considered only in the context of the existing HVCCC modelling and existing infrastructure constraints;
2. be taken to provide some guidance to industry as to the broad direction which might lead to more efficient utilisation of Coal Chain Capacity, in order to inform near term investment decisions; and
3. not necessarily be taken as an outcome of any more robust coal chain modelling, nor development of the Indicative Service.

Stakeholders recognised that there was no guarantee that the long term outcome (Indicative Service) would necessarily reflect the initial Indicative Service, and any investment decisions by stakeholders could not rely on this being the case.

Development of the initial Indicative Service

In accordance with the 2011 HVAU, ARTC, in consultation with the HVCCC, selected a number of combinations of Coal Train configurations including Interim Indicative Services for modelling. Due to constraints imposed by the limited time frame, testing only of combinations that either already existed and/or had been previously developed by the HVCCC was feasible.

Six combinations were modelled by the HVCCC as follows:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sc 1: 91 in PZ 1&amp;2, 82(25) in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 91 wagon size, all PZ 3 consist are of 82 wagon size light loaded to 25 t exle load</td>
</tr>
<tr>
<td>Sc 2: 74 in PZ 1&amp;2, 82(25) in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 74 wagon size, all PZ 3 consist are of 82 wagon size light loaded to 25 t exle load</td>
</tr>
<tr>
<td>Sc 3: 96 in PZ 1&amp;2 XU (PH) in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 96 wagon size, all PZ 3 consist are of 82 wagon size light loaded to 25 t exle load</td>
</tr>
<tr>
<td>Sc 4: 91 in PZ 1&amp;2, 72 in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 91 wagon size, all PZ 3 consist are of 72 wagon size</td>
</tr>
<tr>
<td>Sc 5: 74 in PZ 1&amp;2, 72 in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 74 wagon size, all PZ 3 consist are of 72 wagon size</td>
</tr>
<tr>
<td>Sc 6: 96 in PZ 1&amp;2, 72 in PZ 3</td>
<td>All PZ 1&amp;2 consist are of 96 wagon size, all PZ 3 consist are of 72 wagon size</td>
</tr>
</tbody>
</table>

Key modelling assumptions included:

1. adoption of 2012 (160Mtpa) System Assumptions scenario;
2. modelling was undertaken based on both with and without Maitland to Minimbah 3rd road scenario for the full calendar year;
3. to enable a comparison with Base Case and between each Indicative Service scenario a “train fleet adjustment factor” was used based on a total fleet capacity approach (based on the number of consists and a generic cycle time for each consist type, where the generic cycle time is held constant for each scenario which allows for a more accurate and robust fleet adjustment for each scenario and is sensitive to changes in wagon carrying capacity); and
4. the impact of congestion was ignored.

Modelling was undertaken based on both with and without Maitland to Minimbah 3rd road scenario for the full calendar year. The absence of the M2M acts as a proxy for an environment in which the port is not a constraint.

Output from the HVCCC modelling is shown at Section 3 and includes:

1. Delivered throughput
2. No. of required export consists
3. Average tonnes per consist
4. Average daily planned path utilisation
5. Average vessel queue

**ARTC’s proposal**

Due to the nature of the model utilised and the fixed delivered throughput value of 160mtpa; ARTC believes that the most appropriate efficiency measures to compare are:

1. Total Export Train Consists Required
2. Path Utilisation
3. Average Vessel Queue

Decreased path utilisation in the short term increases network flexibility to manage live run disruption events and in the longer term reduces the need for capital expenditure on infrastructure.

ARTC acknowledges the limitations to the current HVCCC model in relation to testing of vessel cargo sizes that reflect a larger train consist. However, ARTC understands that if the selected 96/82 combination were used a throughput larger than 160mtpa would result from the modelling.

Furthermore ARTC recognizes that the differentiation between the various scenarios of Delivered Throughput and associated Vessel Queue size would manifest itself in shipping delays and could be quantified in demurrage fees that are materially significant.

Given these criteria; the combination of 96 wagon trains in Pricing Zones 1 & 2 and 82 wagon trains in Pricing Zone 3 & 1 (as displayed by Scenario 3 tested) is the Coal Train configuration
which ARTC considers will represent the most efficient utilisation of Coal Chain Capacity when compared to the other Coal Train configurations tested.

**Stakeholder Comment**

In accordance with the 2011 HVAU, ARTC offers Access Holders and Operators the opportunity to make comment in relation to ARTC’s proposal by way of a written submission to be provided to ARTC or by email no later than 5:00pm on **Tuesday 22 November 2011**.

Submissions can be emailed to gedwards@artc.com.au or posted to the following address:

Glenn Edwards  
Manager, Economic Regulation  
PO Box 10343  
Gouger Street  
Adelaide 5000
2. Relevant Development of ARTC’s 2011 Hunter Valley Access Undertaking

The 2011 HVAU accepted by the ACCC was lodged by ARTC on 23 June 2011. This followed lodgement (and subsequent withdrawal) of two earlier versions of the Hunter Valley access undertaking, occurring in early September 2010, where ARTC lodged its 2010 Hunter Valley Coal Network Access Undertaking (2010 HVAU) and in previously in April 2009, where lodged its original Hunter Valley access undertaking (2009 HVAU).

2.1 2009 HVAU

All of these lodgings followed substantial consultation with relevant industry stakeholders and the ACCC, resulting in significant re-engineering of many parts of initial consultation documents provided to industry in mid 2008 and the 2009 HVAU in order to address industry needs.

In the 2009 HVAU, ARTC committed to the development of the Indicative Service, needed to underpin coal pricing, but sought to recognise that the limitations of existing institutional arrangements (such as the HVCCC not being established at the time) and existing coal chain modelling may constrain development of the indicative service intended to represented optimal coal chain capacity utilisation in a comprehensive and effective manner. ARTC committed to such development when the use of the indicative service to represent optimal coal chain capacity utilisation and underpin pricing was formally recognised in the undertaking, and when it considered appropriate institutional arrangements and modelling were in place.

The Draft Decision\(^1\) on the 2009 HVAU released by the ACCC reflected industry concerns in relation to the lack of process and timeframes in relation to the development of the Indicative Service. Of particular relevance, the Draft Decision sought that:

‘… ARTC should clearly specify the date Indicative Service descriptions and related access charges will be proposed for consultation with industry, the date these will come into effect and the date these must be approved by the ACCC.’\(^2\)

\(^1\) ACCC Draft Decision, 5 March 2010.
\(^2\) ACCC Draft Decision, 5 March 2010, p628.
2.2 2010 HVAU

Following further consultation with the industry and ACCC, ARTC revised its proposal in relation to the development of the Indicative Service to:

1. prescribe a detailed process for the development and proposal of the Indicative Service (including development in consultation with the HVCCC);

2. provide for submission of the characteristics of the indicative service to the ACCC for approval within 12 months of ARTC being reasonable satisfied that modelling undertaken by the HVCCC was sufficiently robust to enable an efficient train configuration that optimises Coal Chain Capacity to be accurately determined; and

3. provide for, in any event, submission of the characteristics of the indicative to the ACCC for approval within 4 years of the Commencement Date.

The latter revisions were intended to:

1. reflect ARTC’s caution in relation to the development of the Indicative Service (and associated pricing signals) before modelling existed that would enable it’s accurate determination, and the risk of sending out inappropriate pricing signals as a result;

2. reflect ARTC’s expectations as to a reasonable timeframe during which the HVCCC and ARTC could design and develop appropriate modelling;

3. provide the industry with a maximum timeframe for the development of the Indicative Service; and

4. reflect the ACCC’s views as to what it considered to be a reasonable balance between the parties’ interests at the time.

The Position Paper\(^3\) on the 2010 HVAU reflected further concerns of stakeholders as follows:

‘… interested parties expressed concern at ARTC’s proposed timeframe, with recommendations that the service be determined in a shorter period, but with appropriate transitioning for parties who may have invested on the basis of the current arrangements (see further above).

\(^3\) ACCC Position Paper, December 2010
In light of these views, the ACCC considers that the development of an efficient train configuration should be undertaken expeditiously, to promote the efficient use of the Hunter Valley rail network as soon as possible, as well as to encourage efficient complementary investment by parties using the network (such as investment in rolling stock). The ACCC’s view is also informed by its understanding that long lead times are not required for the HVCCC to provide requisite data to ARTC to facilitate the process.

Consequently, the ACCC considers that ARTC should submit a proposed variation of the HVAU, regarding the efficient train configuration and appropriate pricing approach, to the ACCC within six months of receiving the relevant information from the HVCCC, and in any event within twelve months of the commencement of the undertaking.\(^4\)

During further consultation with the ACCC, ARTC expressed its concerns with the ACCC position above, in that the timing referred to for the provision of adequate HVCCC advice could only relate to where that advice was forthcoming from existing HVCCC modelling.

ARTC subsequently confirmed with the HVCCC that existing HVCCC modelling was not sufficient to develop a configuration that represented optimal utilisation of the coal chain which considered optimisation of the coal chain as a whole, including all parts of that chain. This was ARTC’s intended purpose for the development of the Indicative Service which it understood was in line with industry requirements expressed to ARTC in 2008, where pricing signals were intended to incentivise users to adopt optimal configuration across the coal chain, as opposed to one aspect of the chain based on existing constraints.

ARTC also confirmed with the HVCCC that it would take a number of years to develop modelling that could achieve this objective.

In ARTC’s view, the ACCC position would result in the development of an Indicative Service that was not necessarily consistent with optimal utilisation across the coal chain, but may result in efficient utilisation of one part of that coal chain bound by constraints placed on the coal chain by existing infrastructure limitations (such as load/unload rates) that could be incorporated in existing HVCCC modelling.

ARTC did not believe that if it were to provide for the development of the Indicative Service aligned to the ACCC position, then efficient or optimal utilisation of the coal chain as a whole, and pricing signals to deliver this, may not be the outcome.

\(^4\) ACCC Position Paper, December 2010, p135
2.3 2011 HVAU

Following further consultation with key stakeholders, supported by the ACCC, ARTC sought to agree a solution that achieved a balance between:

1. the expressed concern by the industry in relation to the timing of advice in relation to efficient utilisation of the coal chain for certainty of investment in rolling stock;

2. ARTC’s concerns in relation to basing such advice on robust whole of chain optimisation modelling rather than existing HVCCC modelling; and

3. HVCCC requirements in relation to reasonable model development times.

The solution agreed between ARTC and key stakeholders is prescribed in the 2011 HVAU, and represents a balance between the parties’ interests in that;

1. At least some guidance is provided to industry in the short term in relation to efficient utilisation of the coal chain that can inform early investment decision making;

2. It is clear that such advice is based only on existing HVCCC modelling and, as such, there are constraints on that advice in relation to optimal utilisation of coal chain capacity as a whole;

3. Such advice should not necessarily be taken as an outcome of any more robust coal chain modelling, nor development of the Indicative Service; and

4. The time frame for development of the early advice is reasonable, as is the time frame allowed for development of more robust modelling.

Key stakeholders recognised that there was no guarantee that the long term outcome (Indicative Service) would necessarily reflect the initial Indicative Service, and any investment decisions by stakeholders could not rely on this being the case.
3. Process for developing the initial Indicative Service

Relevant parts of Section 4.17 of the 2011 HVAU from for the development of the initial Indicative Service as follows:

4.17 Initial Indicative Service

(a) ARTC will, in consultation with the HVCCC:

   (i) select a reasonable number of alternative Coal Train configurations in addition to the Coal Train configurations forming the Interim Indicative Services;

   (ii) test the consumption of Coal Chain Capacity by those Coal Train configurations using the HVCCC modelling existing as at the Commencement Date (including, to avoid doubt, the coal chain infrastructure constraints as used by existing HVCCC modelling) unless otherwise agreed by ARTC and the HVCCC; and

   (iii) select the Coal Train configuration which it considers will represent the most efficient utilisation of Coal Chain Capacity when compared to the other Coal Train configurations tested.

(b) ARTC will consult with the HVCCC, Access Holders and Operators on the initial indicative service selected under subsection (a).

(c) Within 5 months of the Commencement Date, and after having regard to submissions arising from the consultation at subsection (b), ARTC will:

   (i) submit to the ACCC:

       (A) the characteristics of the initial indicative service selected as a result of the process described in subsection (a); and

       (B) the indicative access charges for the initial indicative service; and
(ii) seek the approval of the ACCC to vary this Undertaking to provide for the adoption of the initial indicative service and indicative access charges applicable until ARTC develops and the ACCC accepts the indicative service and indicative charges under section 4.18.

(d) Within 30 Business Days of receiving approval from the ACCC to vary the Undertaking under subsection (c), publish the characteristics of the initial Indicative Service, initial Indicative Access Charge and Charges for non-Indicative Services, including those which were Interim Indicative Services and the annual process for the finalisation of Indicative Access Charges under section 4.18 will not apply to the determination of Indicative Access Charges for that year.’

In accordance with Section 4.17(a) and (b), this consultation document relates to the development of the initial Indicative Service and seeks stakeholder comments in relation to ARTC’s proposal in relation to the initial Indicative Service.

3.1 Project Scope

Relevant parts of Section 4.17 of the 2011 HVAU from for the development

Following initial consultation on this matter with the HVCCC, ARTC developed and provided a scoping document to the ACCC with a request for modelling support and advice. Key elements of the scoping document are provided below.

Coal train configurations identified for testing

The document broadly sought to, in identifying a ‘reasonable number of alternative Coal Train configurations in addition to the Coal Train configurations forming the Interim Indicative Services’, achieve a balance between the needs of key stakeholders for a comprehensive assessment with the capability of the HVCCC to undertake efficient and effective modelling within the proposed timeframe.

Specifically, the HVCCC advised that the task of modelling a Coal train configuration that currently exists (such as the Interim Indicative Services) is relatively straightforward and feasible. On the other hand, ARTC understood from the HVCCC that modelling a Coal train configuration that does not currently exist is, whilst feasible, a substantially bigger task involving data analysis and population. Given the time frame for submission to the ACCC (by
30 November) and the need to consult with stakeholders, ARTC sought to limit the scope so as to keep testing of alternatives that did not currently exist to a minimum.

ARTC sought to identify Coal Train configurations that either exist or have previously been tested by the HVCCC. ARTC proposed the following Coal Train configurations for testing (Table 1):

Table 1

<table>
<thead>
<tr>
<th>Coal Train Configuration</th>
<th>Service</th>
<th>Pricing Zones (PZ)</th>
<th>Axle Load</th>
<th>Max. Speed</th>
<th>Train length</th>
<th>Load</th>
<th>Section Run Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interim Indicative Service 1</td>
<td>1,2</td>
<td>30T</td>
<td>60kph (ld) 80kph (ety)</td>
<td>91 wagons (1536m)</td>
<td>8500NT</td>
<td>As per HV SWT</td>
</tr>
<tr>
<td>2</td>
<td>Interim Indicative Service 2</td>
<td>1,2</td>
<td>30T</td>
<td>60kph (ld) 80kph (ety)</td>
<td>74 wagons (1280m)</td>
<td>7200NT</td>
<td>As per HV SWT</td>
</tr>
<tr>
<td>3</td>
<td>Alternative PZ1/2 Service 1</td>
<td>1,2</td>
<td>30T</td>
<td>60kph (ld) 80kph (ety)</td>
<td>96 wagons$^a$ (1570m)</td>
<td>9000NT</td>
<td>As per HV SWT</td>
</tr>
<tr>
<td>4</td>
<td>Interim Indicative Service 3</td>
<td>1,3</td>
<td>25T</td>
<td>80kph (ld) 80kph (ety)</td>
<td>72 wagons (1272m)</td>
<td>5400NT</td>
<td>As per HV SWT</td>
</tr>
<tr>
<td>5</td>
<td>Alternative PZ3 Service</td>
<td>1,3</td>
<td>25T</td>
<td>80kph (ld) 80kph (ety)</td>
<td>82 wagons$^b$ (1350m)</td>
<td>6330NT</td>
<td>As per HV SWT</td>
</tr>
</tbody>
</table>

Notes

$^a$ & $^b$: Wagon types utilised have dimensions that are capable of fitting existing loop sizes within pricing zone 2 & 3 inclusive of attached locomotive power

Id: Loaded ety: Empty HV SWT: Hunter Valley Standard Working Timetable

Nature of testing

To inform ARTC of the Coal Chain Capacity impact of different train types used in a Pricing Zone (PZ), testing should not ignore the fact that the Hunter Valley ‘system’ (PZ1, PZ2 and PZ3) is shared by trains operating from PZ1 and PZ2 mines, as well as different trains from PZ3 mines. The difference in train configurations is necessitated by infrastructure constraints that exist in PZ3 (compared to PZ1 and PZ2). The difference in train configuration is also likely to impact on Coal Chain Capacity due to their interaction in PZ1. A proper consideration of the Coal Chain Capacity impacts of different train configurations needs to have regard for utilisation of the Hunter Valley ‘system’. To this end, modelling of PZ1, PZ2 and PZ3 comparing the shared usage of the Hunter Valley ‘system’ by different combinations of above train configurations is required.

The result of this testing should provide guidance in relation to the efficient utilisation of Coal Chain Capacity from a Hunter Valley ‘system’ perspective.
The HVAU prescribes that the modelling be based on infrastructure constraints used by HVCCC modelling existing as at 1 July 2011 (the Commencement Date of the HVAU), unless otherwise agreed between ARTC and the HVCCC. To be consistent with the period to which pricing outcomes from the identification of the initial Indicative Service relate, ARTC considers it is likely that infrastructure constraints expected to be in place in 2012 (as contemplated in ARTC’s corridor strategy and the coal chain master plan (as applicable)) would be a more appropriate assumption than using 2011 constraints. In any event, certain infrastructure constraints such as the availability of the wagon configurations needed for the above Coal Train configurations may limit the extent to which Coal Train configurations can be used.

Nature of outputs

ARTC expects that the most important measure of Coal Chain Capacity is throughput tonnes. This is evidenced by the annual specification by the HVCCC of Coal Chain Capacity in these terms. As such, ARTC would expect that the results of testing of any of the above configurations would be prescribed in terms of throughput tonnes for each scenario tested.

Having said this, other output measures may also be useful in adding context around throughput tonnes. For example, the extent to which available paths are used in a particular scenario will provide an indication of the extent of congestion that might exist in a particular scenario and the ability of the coal chain to manage activity where disruption events (e.g. breakdown, slow running) arise. As such, different throughput volume results may be more or less likely to be achieved given the different levels of path utilisation associated with different scenarios.

3.2 HVCCC Modelling

In its current design, the “Whole of Coal Chain” simulation model is configured to allow train consist type to be defined by Producer and Load point combinations. It is not designed to allow for generic 75/25% or 50/50% type combinations of different train configurations to be modelled.
3.3 HVCCC Advice

Scope of modelling

The following configurations, as requested by ARTC, were able to be modelled;

- For Pricing Zones 1 & 2: 96, 91 and 74 wagon consists
- For Pricing Zone 3: 82 and 72 wagon consists

The following is a summary of the scenarios modelled for this analysis.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sc 1: 91 in PZ 1 &amp; 2 (75 in PZ 3)</td>
<td>All PZ 1 &amp; 2 consist are of 91 wagon size, all PZ 3 consist are of 82 wagon size, light loaded to 261 axle load</td>
</tr>
<tr>
<td>Sc 2: 74 in PZ 1 &amp; 2 (75 in PZ 3)</td>
<td>All PZ 1 &amp; 2 consist are of 74 wagon size, all PZ 3 consist are of 82 wagon size, light loaded to 261 axle load</td>
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<td>All PZ 1 &amp; 2 consist are of 96 wagon size, all PZ 3 consist are of 72 wagon size</td>
</tr>
</tbody>
</table>

The Base Case refers to train fleet requirements outlined in 2012 (160Mtpa) System Assumptions.

Modelling was undertaken based on both with and without Maitland to Minimbah 3rd road (M2M) scenario for the full calendar year. The absence of the M2M acts as a proxy for an environment in which the port is not a constraint.

Modelling outputs are provided in terms of:

- Delivered throughput
- No. of required export consists
- Average tonnes per consist
- Average daily planned path utilisation
- Average vessel queue
Assumptions used

2012 System Assumptions

The HVCCC modelling analysis was carried out using the 2012 (160Mtpa) System Assumption scenario. The following major infrastructure assumptions were included in the analysis:

<table>
<thead>
<tr>
<th>Total Infrastructure Requirements to Achieve 160.0Mtpa in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure Initiative</strong></td>
</tr>
<tr>
<td>Track</td>
</tr>
<tr>
<td>- Completion of Minimbah to Maitland 3rd Track</td>
</tr>
<tr>
<td>Terminals</td>
</tr>
<tr>
<td>- PWCS 145 Master Plan, KCT Initiatives; K7, Full Pads C &amp; D</td>
</tr>
<tr>
<td>- Pumps Stream 1 at 8,000tph</td>
</tr>
<tr>
<td>- 60% Train Unloading Efficiency at KCT and NCIG for Largo Trains</td>
</tr>
<tr>
<td>- NCIG Stage 1</td>
</tr>
<tr>
<td>Trains</td>
</tr>
<tr>
<td>- 52 Train Consists</td>
</tr>
<tr>
<td>Port Operations</td>
</tr>
<tr>
<td>- Ability to SAIL 3 Cape Vessels on Tide</td>
</tr>
<tr>
<td>- 8 Available Manned Tugs</td>
</tr>
<tr>
<td>- Adequate Pilots and Linesmen</td>
</tr>
<tr>
<td>Load Points</td>
</tr>
<tr>
<td>- Improvement Required to 18 Load Points</td>
</tr>
<tr>
<td>KCT Refuelling</td>
</tr>
<tr>
<td>- No KCT Refuelling Impacts and No Train Provisioning Delays</td>
</tr>
</tbody>
</table>

Other Assumptions

- **Train Fleet Adjustment Factor**
  
  To enable a comparison with Base Case and between each Indicative Service scenario a “train fleet adjustment factor” is required. There are a number of approaches that can be used for the development of an adjustment factor, namely:

  - Adjustment based on the number of train consists: This approach was rejected as it can lead to a skewing of results and it is difficult to determine a like for like comparison due to variation in consist size. Adopting this approach would lead to a ‘surplus’ of train consists and carrying capacity being generated in some scenarios, making robust comparison between scenarios problematic.

  - Adjustment based on number of wagons: This approach was also rejected as it does not allow for an analysis of differing wagon carrying capacity options used in some scenarios. Once again, this option would make robust comparison between scenarios problematic.

  - Adjustment based on total fleet capacity: Based on the number of consists and a generic average cycle time for each consist type. The generic cycle time is held constant for each scenario. This scenario allows the number of consists required for each scenario to be adjusted against the overall total ‘theoretical’ fleet carrying capacity of the Base Case scenario (i.e. 160Mtpa System
Assumptions). Under this approach, the number of train consists required for a particular scenario is adjusted up or down based on the Base Case fleet carrying capacity.

The total fleet capacity approach was used in this analysis as it allows for a more accurate and robust fleet adjustment for each scenario and is sensitive to changes in wagon carrying capacity.

- The impact of congestion was not considered as the ability of current HVCCC modelling to incorporate this aspect is still being developed.

- It is **important to note** that in the 96 wagon consist scenarios, no adjustment was made to cargo parcels sizes to better match whole consist increments. This adjustment would likely further improve the 96 wagon scenario’s delivered throughput performance. To make this adjustment would require major re-coding of the simulation model and will be considered in the Indicative Service modelling and analysis.
Modelling Results

1. With Minimbah to Maitland 3rd road
   Signed off load point performance
   Excludes congestion

   a. Delivered throughput and required Consists

   ![Graph showing delivered throughput and required consists]

   This graph illustrates the number of train consists required to deliver throughput of 160Mtpa when M2M is completed. Relevant observations are:

   • Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can deliver throughput of 160Mtpa;
   • Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can only achieve throughput up to 156Mtpa (less than the Base Case);
   • Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can achieve 160Mtpa with fewer train consists than the Base Case, and those scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2.
   • Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 require fewer consists than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3.
   • Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 requires the least number of train consists to achieve 160Mtpa.
b. Efficiency Measures – average tonnes/consist and average daily planned path utilisation

This graph illustrates average train size and path utilisation at Nundah Bank required to deliver throughput of 160Mtpa when M2M is completed. Relevant observations are:

- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can deliver throughput of 160Mtpa with increased average train size compared to the Base Case;
- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can achieve 160Mtpa with reduced utilisation of paths compared to the Base Case, and those scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2. This is likely to increase the robustness of the associated timetables and ability to deal with congestion/disruption events, thus increasing the likelihood of deliverability.
- Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 result in increased utilisation of paths compared to the Base Case and lower throughput;
- Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 resulted in lower levels of path utilisation than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3.
- Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 results in the lowest level of path utilisation and maximises deliverability compared to other scenarios.
c. Efficiency measures - average Vessel Queue

This graph illustrates average vessel queue required to deliver throughput of 160Mtpa when M2M is completed. Relevant observations are:

- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can achieve 160Mtpa with a reduced average vessel queue size compared to the Base Case, and those scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2. This results in more efficient overall system delivery performance which would translate to lower cost risk to the industry. The Base Case is configured on a demurrage neutral basis which is approximately equal to an average vessel queue size of 15.

- Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 result in much higher average vessel queue size compared to the Base Case and lower throughput;

- Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 resulted in slightly lower average vessel queue size than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3 for 96 wagon Coal Train configuration scenarios with a bigger reduction in 91 wagon Coal Train configuration scenarios.

- Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 results in the lowest average vessel queue size compared to other scenarios.
2. Without Minimbah to Maitland 3rd road
   Signed off load point performance
   Excludes congestion

   a. Delivered throughput and required consists

This graph illustrates the number of train consists required to deliver throughput of 160Mtpa without M2M is completed. Relevant observations are:

- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can deliver throughput of 160Mtpa, whereas the Base Case cannot;
- Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can only achieve throughput up to 147Mtpa (less than the Base Case);
- Scenarios other that those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can achieve 160Mtpa with fewer train consists than the Base Case, and those scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2.
- Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 require fewer consists than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3.
- Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 requires the least number of train consists to achieve 160Mtpa.
b. Efficiency Measures— average tonnes/consist and average daily planned path utilisation

This graph illustrates average train size and path utilisation at Nundah Bank required to deliver throughput of 160Mtpa without M2M. Relevant observations are:

- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 can deliver throughput of 160Mtpa with increased average train size compared to the Base Case;
- Scenarios other than those incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 (other than Scenario 4) can achieve 160Mtpa with reduced utilisation of paths compared to the Base Case, and those scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2. This is likely to increase the robustness of the associated timetables and ability to deal with congestion/disruption events, thus increasing the likelihood of deliverability.
- Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 result in increased utilisation of paths compared to the Base Case and lower throughput;
- Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 resulted in lower levels of path utilisation than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3.
- Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 results in the lowest level of path utilisation and maximises deliverability compared to other scenarios.
c. Efficiency measures - average vessel queue

This graph illustrates average vessel queue required to deliver throughput of 160Mtpa without M2M. Relevant observations are:

- Scenarios other than those incorporating the 74 wagon Coal Train and 91/72 Coal Train configurations in PZ1 and PZ2 can achieve 160Mtpa with a much reduced average vessel queue size compared to the Base Case, and those scenarios incorporating the 74 wagon Coal Train and 91/72 Coal Train configurations in PZ1 and PZ2. This results in more efficient overall system delivery performance which would translate to lower cost risk to the industry. The Base Case is configured on a demurrage neutral basis which is approximately equal to an average vessel queue size of 15.
- Scenarios incorporating the 74 wagon Coal Train configuration in PZ1 and PZ2 result in much higher average vessel queue size compared to the Base Case and lower throughput;
- Scenarios incorporating the 82 wagon Coal Train configuration in PZ3 resulted in lower average vessel queue size than those scenarios incorporating the 72 wagon Coal Train configuration in PZ3.
- Scenario 3 incorporating the 96 wagon Coal Train configuration in PZ1 and PZ2 and the 82 wagon Coal Train configuration in PZ3 results in the lowest average vessel queue size compared to other scenarios.
### 3. Train fleet requirements

<table>
<thead>
<tr>
<th>Modelled Train Configurations</th>
<th>No of Consists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BB Wagon</td>
</tr>
<tr>
<td>Baco Gaco</td>
<td>32</td>
</tr>
<tr>
<td>Sc 3. 74 in NZ 162, 89(25t) in NZ 3</td>
<td>34</td>
</tr>
<tr>
<td>Sc 3. 96 in NZ 162, 89(25t) in NZ 3</td>
<td>32</td>
</tr>
<tr>
<td>Sc 4. 91 in NZ 162, 72 in NZ 3</td>
<td>34</td>
</tr>
<tr>
<td>Sc 5. 74 in NZ 162, 72 in NZ 3</td>
<td>32</td>
</tr>
<tr>
<td>Sc 6. 96 in NZ 162, 79 in NZ 3</td>
<td>32</td>
</tr>
</tbody>
</table>
4. **ARTC Proposal**

Due to the nature of the model utilised and the fixed delivered throughput value of 160mtpa; ARTC believes that the most appropriate efficiency measures to compare are:

1. Total Export Train Consists Required
2. Path Utilisation
3. Average Vessel Queue

Decreased path utilisation in the short term increases network flexibility to manage live run disruption events and in the longer term reduces the need for capital expenditure on infrastructure.

ARTC acknowledges the limitations to the current HVCCC model in relation to testing of vessel cargo sizes that reflect a larger train consist. However, ARTC understands that if the selected 96/82 combination were used a throughput larger than 160mtpa would result from the modelling.

Furthermore ARTC recognizes that the differentiation between the various scenarios of Delivered Throughput and associated Vessel Queue size would manifest itself in shipping delays and could be quantified in demurrage fees that are materially significant.

Given these criteria; the combination of 96 wagon trains in Pricing Zones 1 & 2 and 82 wagon trains in Pricing Zone 3 & 1 (as displayed by Scenario 3 tested) is the Coal Train configuration which ARTC considers will represent the most efficient utilisation of Coal Chain Capacity when compared to the other Coal Train configurations tested.
5. **Request for Stakeholder Comment**

At Section 4.17(b) of the 2011 HVAU, ARTC has committed to consult with the HVCCC, Access Holders and Operators in relation to the initial Indicative Service. ARTC has worked closely with the HVCCC in the establishment of alternatives and modelling of options during the development of the initial Indicative Service. Indeed, ARTC’s proposal outlined in Section 4 of this paper is, by and large, based on the modelling advice provided to it by the HVCCC as detailed in Section 3 of this paper.

The 2011 HVAU requires ARTC to submit to the ACCC the characteristics of the initial indicative service resulting from development process undertaken in consultation with the HVCCC by 30 November 2011. ARTC will also at that time submit the indicative access charges for the initial indicative service and seek the approval of the ACCC to vary the 2011 HVAU to adopt the initial indicative service and indicative access charge.

In order for ARTC to comply with these obligations, ARTC offers Access Holders and Operators the opportunity to make comment in relation to ARTC’s proposal by way of a written submission to be provided to ARTC or by email no later than 5:00pm on **Tuesday 22 November 2011**.

Submissions can be emailed to gedwards@artc.com.au or posted to the following address:

Glenn Edwards  
Manager, Economic Regulation  
PO Box 10343  
Gouger Street  
Adelaide 5000