Discussion paper response
Submission No 18a

INQUIRY INTO DEFENCE INDUSTRY IN NEW SOUTH WALES

Organisation: Regional Development Australia - Hunter

Date received: 12 February 2018

Submission to

Parliament of NSW

Legislative Council: Standing Committee on State Development

Defence Industry in New South Wales: Discussion Paper

feedback from

RDA Hunter

An Australian Government Initiative

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Defence Industry in New South Wales – Discussion Paper

INTRODUCTION

RDA Hunter appreciates the opportunity to comment on the Committee's Discussion Paper: Defence industry in New South Wales.

We support a strong defence industry sector as part of the Hunter's economy. RDA Hunter, as the region's economic development advocate, has identified three priority areas of focus that underpin regional growth and maintain international competitiveness - innovation, investment and infrastructure.

Additionally, a STEM skilled workforce enables innovation-driven growth and industry competitiveness. Our feedback in this submission focuses on aspects of RDA Hunter's STEM Workforce Development initiatives.

Industry leadership is a common theme of our efforts to help build a highly skilled workforce for the benefit of the Hunter.

Industry advice on the knowledge, skills and government support they require to be competitive is crucial.

Industry partnerships are critical to develop and deliver innovative STEM projects which produce outcomes that meet industry needs.

Beyond the invitation to provide written submissions, the Committee is commended for undertaking site visits to experience defence industry operations. RDA Hunter also thanks the Committee Chair, The Hon Greg Pearce MLC, for attending our pre-Pacific 2017 event last October.

RESPONSES TO SOME SPECIFIC QUESTIONS RAISED IN THE DISCUSSION PAPER.

QUESTION 10

a.) What actions are currently being implemented by the NSW Government and other educational providers to promote STEM skills in primary, secondary, and tertiary education institutions?

Since 2009, RDA Hunter has been undertaking activities to STEM skill the region's future workforce. These initiatives are collectively known as RDA Hunter's STEM Workforce Initiative and comprise Mini ME, ME Program and STEMship. They are life-stage specific, education programs that together create a pipeline of opportunities and activities for students from eight years of age to 18 years old.

Mini ME – STEM intervention program for primary schools (Years 5 and 6);

ME Program – Increases the number of students undertaking STEM subjects in participating schools. Our Defence Industry skilling program raises student awareness and knowledge of Defence and defence industry career pathways.

STEMship – An innovative Vocational Education and Training (VET) pre-employment program incorporating Science, Technology, Engineering, Mathematics and Entrepreneurship skills and capabilities.

In close partnership with local industry, which includes defence prime contractors, multi-nationals and SMEs, students are immersed in industry focused and designed curriculum as well as professional placements and work experience.

These activities encourage student interest in STEM careers and ensure their preparedness for the jobs that projects such as RAAF's Joint Strike Fighter will create in the region in the future.

RDA Hunter strives to maintain the relevance of its programs and has effectively engaged with over 50 industry partners and a broad base of stakeholders to ensure its initiatives are truly industry-led.

b.) What further steps can the NSW Government take to promote STEM subjects and associated defence industry careers? Should the NSW Government launch an advertising campaign to promote the study of STEM subjects as well as promote NSW as a technology leader?

The Commonwealth Government launched an advertising campaign "*The Workforce Behind the Defence Force*" promoting defence industry jobs and career pathways.

https://www.defenceindustry.gov.au/?gclid=Cj0KCQiAh_DTBRCTARIsABlT9MZ-eUtpMJY5xiIzYH5Tprld8SuCJptMp6bOh_tm sgHy5ha8DUdyYeYaAiqWEALw_wcB

The NSW Government could leverage from this campaign, whilst ensuring there is no duplication of advertising across the same sector.

c.) Should the NSW Government take steps to embed defence-related industry interaction, within the education syllabus?

Yes. RDA Hunter's experience in developing ***iSTEM*** (integrated STEM subject for high schools) shows that industry involvement is integral to developing curriculum of relevance to students and 21st century learning. In a review of Science, Mathematics and Engineering (2012) by the Office of the Chief Scientist of Australia, it was commented that teaching needs to be high quality and inspirational while science and mathematics based content was generally seen as … "irrelevant to life after school." And, "Content based teaching is seen as boring because so much is seen as knowledge transmission of correct answers with neither time nor room for creativity, reflection or offering opinions".

In 2013, Regional Development Australia Hunter's ME Program in collaboration with local industry and STEM teachers at Maitland Grossmann High School developed the iSTEM curriculum. iSTEM is a student-centred subject for students in Years 9 and 10 that delivers knowledge in Science, Technology, Engineering and Mathematics (STEM) in an integrated way.

Incorporating mechatronics, aerodynamics, engineering, 3D CAD/CAM, aerospace and motion modules, iSTEM presents maths, sciences engineering and technology to students in ways that challenge their understanding of these subjects and develops their ability to manage projects and work in teams. iSTEM was created in the Hunter region in direct response to industry's urgent demand for STEM qualified young people.

BAE Systems, Ampcontrol and Varley Group are among 50 ME Program industry partners who were integral to the formation and implementation of the iSTEM syllabus.

QUESTION 11

a.) What steps can the NSW Government take to close gender gaps in the participation of females in STEM career pathways as relevant to the defence industry?

RDA Hunter has managed all-female STEM activities to promote female participation. In 2018, there are 14 *All Girls* schools endorsed for iSTEM in NSW which demonstrates female engagement in STEM based activities.

Female STEM engagement programs managed by RDA Hunter:

- SheFlies Summer Camp for an all-girls cohort (60 students);
- ME Program / University of Wollongong travelling STEM roadshow for two all-girls cohorts (300 students);
- STEM Ex opportunities provided to 50% females – RDA Hunter managed work experience opportunities with Defence industry partners.
- MiniME activities provided to whole-of-class primary school age students.

QUESTION 12

a.) What benefits have been delivered by the ME Program to date? Based on this evidence, what steps should the NSW Government take to support the program and explore its roll out across the state?

RDA Hunter appreciates the Committee's recognition of the ME Program and the contribution it makes to defence industry.

A brief history of the development of RDA Hunter's ME Program as a School Pathways and Industry Skilling program, may assist the Committee's understanding of its effectiveness and potential.

Regional Development Australia (RDA) Hunter was formed in 2009, as a result of the amalgamation of the Hunter Economic Development Corporation (HEDC), a state association, and the Hunter Area Consultative Committee, a Commonwealth body.

In our first year, RDA Hunter was contracted by the Commonwealth of Australia, through the Department of Defence (Defence Materiel Organisation), as the legal entity to provide the preliminary work for the Advanced Manufacturing School Pathways Program (AMSPP). Initial scoping for this work had been conducted by HEDC.

Following this preliminary work on the viability of the AMSPP, the Commonwealth contracted RDA Hunter to deliver a pilot program, involving four high schools and four industry partners. During the pilot phase in 2009 and 2010, under the banner "Manufacturing Success Through Education", the School Pathways Program became known as the ME Program.

Successive contracts with the Australian Department of Defence have given RDA Hunter the capacity to create, deliver and manage the expansion and successes of the ME Program.

Since 2010 - 2011 overall **participation in STEM subjects** for ME Program Schools to the end of 2017 had **increased by 19.22%.**

Over the period from 2010 to 2017, individual subject increases for ME Program Schools were: Biology, **13%**; Chemistry, **30%;** Engineering Studies, **22%;** Mathematics 2 Unit, **7%**, Mathematics Extension 1, **32%** and Software Design & Development, **12%**. The NSW State average uptake of STEM subjects for this period fell: **-0.5%.**

In early 2018, there are over 210 high schools in NSW endorsed and equipped to deliver iSTEM, with around 1,600 Hunter students enrolled in iSTEM. Without counting the 214 NSW high schools teaching the iSTEM curriculum, RDA Hunter's ME Program will this year have around 17,000 student contacts. Almost all of these contacts will include contact with one or more of our industry partners.

Evidence of the ME Program benefits in promoting the uptake of STEM subjects in Year 11 and 12 is included in Appendix A. The longitudinal data also show significant improvement in STEM subject uptake at ME Program schools in the Hunter.

Subject participation and retention rates have increased from below state averages to above the state-wide trend over the period.

The Board of RDA Hunter welcomes opportunities to explore mechanisms that will see more of New South Wales, especially other defence regions, experience the benefits of productive industry-school partnerships and a growing pool of people equipped with STEM knowledge and skills.

Given ownership of the ME Program rests with RDA Hunter, and the importance of our contractual relationship with the Department of Defence with respect to this program, it is recommended that the Board of RDA Hunter be consulted directly regarding "its roll out across the state".

Summary of ME Program features

RDA Hunter's ME Program is a Defence Industry skilling program to raise student's awareness and knowledge of Defence and defence industry career pathways whilst increasing the number of students undertaking STEM subjects in participating schools and the size of the STEM skilled workforce.

a. iSTEM curriculum in schools:

i. Developed in 2013 it has grown to have more than 210 NSW schools endorsed to teach the curriculum with an estimated 7, 400 students undertaking iSTEM in NSW.

ii. iSTEM is a student centred subject for students in Years 9 and 10 that delivers Science, Technology, Engineering and Mathematics (STEM) in an integrated way.

iii. iSTEM is a School Developed Board Endorsed Course (SDBEC) which has been approved by the NSW Education Standards Authority and forms part of a student's academic record in NSW.

http://www.meprogram.com.au/istem/

b. STEM intervention activities:

The ME Program aims to increase the uptake of STEM subjects at Secondary Institutions via the implementation of a variety of initiatives including;

- School/Industry partnerships
- STEM resources grants
- STEM mentoring programs
- Young entrepreneurship program
- STEM scholarships
- Promotion of Defence and defence Industry careers
- iSTEM curriculum promotion and support

- Careers Expo's (including Defence Industry Marquee)
- Aerospace Careers day
- Hands on STEM activities
- Contextualisation of the curriculum
- STEM outreach events, including Hunter STEM Festival
- STEM education and promotion events
- STEM conferences

In 2016-2017 there was a **45.7%** increase in the number students who were involved in various STEM intervention activities provided by the ME Program. In 2015-2016 there were approximately 8,762 student contacts (not including iSTEM). In **2016-2017 there was a total of 16,132 student contacts** (not including iSTEM). These activities have been designed to expose students to employment pathways related to STEM and Defence Industry.

The ME Program aims to increase the opportunities/ exposure of STEM activities within Secondary Institutions via the implementation of a variety of initiatives including:

- Hunter Valley STEM Festival
- Aeronautical Velocity Challenge
- Mars Rover Challenge
- RoboGALS
- RoboCUP Junior
- Hunter Valley Electric Vehicle Festival
- F1inSchools
- UoW STEM Roadshow
- National Poster Comp
- Science and Engineering Challenge

The ME Program provides secondary schools with enabling technologies and resources designed to engage students in STEM based, industry relevant activities, including:

- 3D Printers
- Mars Rover Kits
- Robotics Systems
- Bottle Rocket Launchers
- Aerospace Resource Kits (Power Anchor)
- STELR Energy Kits
- Solar Powered Car Kits
- Virtual Reality Kits
- Biotechnology Kits
- UAV Kits

c. School defence industry interactions:

The ME Program has developed and implemented several STEM careers experiences as part of the current and previous programs to promote Defence and Defence industry career pathways.

The figure below shows the increase from two (2) events in 2015-2016 to seven (7) events in 2016-2017.

2015-2016	2016-2017
Career Expo's	Career Expo's
BAE Aero Careers Day	Boeing Defence Engineers Talk
	Year 11 Engineering Studies Careers Day
	Jobs of the Future Students
	Jobs of the Future Influencers – parents
	BAE Systems Aero Careers Day
	Boeing & RAAF Careers Day

The ME Program has facilitated **STEM teacher only site visits** to defence industry locations. This provides one on one interactions between specialist STEM teachers and industry engineers and personnel.

QUESTION 15

What measures can the NSW Government take to improve access to advanced trade courses in regional areas? For example, should the NSW Government provide financial support to create defence industry traineeships and apprenticeships in regional areas?

RDA Hunter supports the NSW Government's effort to improve access to advanced trade courses in regional areas. STEMship is RDA Hunter's initiative to connect Secondary School graduates to Defence industry traineeships and apprenticeships.

STEMship is a Hunter based program developed in 2016 by RDA Hunter, the Department of Industry – Training Services NSW and delivered by Hunter TAFE (now TAFE NSW). This program continues to be delivered into 2018 with support from Defence NSW and the Office of Regional Development (DPC).

STEMship is an innovative Vocational Education and Training (VET) pre-employment program incorporating Science, Technology, Engineering, Mathematics and Entrepreneurship skills and capabilities.

STEMship is designed as a multi-disciplinary VET pathway for secondary high school students to enter highly technical apprenticeships and traineeships as an alternate pathway to direct entry to University.

Through this initiative, RDA Hunter promotes job creation and retention in the Hunter by providing a talent pool of work-ready employees for industries primarily in Defence, but also Advanced Manufacturing, Engineering, Resources, Electronics and Aerospace. In its second iteration in 2017, the program has received strong industry support as a key program for workforce development in the Hunter region.

Outcomes 2016	***Students***	***%***
Students commenced	*18*	
Student course complete	*16*	*89%*
Apprenticeship outcomes following STEMship	*8*	*50%*
Further VET training following STEMship	*3*	*19%*

Outcomes 2017	***Students***	***%***
Students commenced	*16*	
Student course complete	*15*	*94%*
Employment outcomes following STEMship	*12*	*75%*
Further VET training following STEMship	*6*	*38%*

As referenced earlier, RDA Hunter's feedback on selected aspects of the Discussion Paper closes with evidence of the impact of the ME Program on students continuing to study STEM subjects at HSC level (Appendix A) and some information about the RDA Hunter and the region (Appendix B).

Appendix A: ME Program supports STEM subject retention rates

Hunter Group1 schools – Year 12 STEM compared with State average

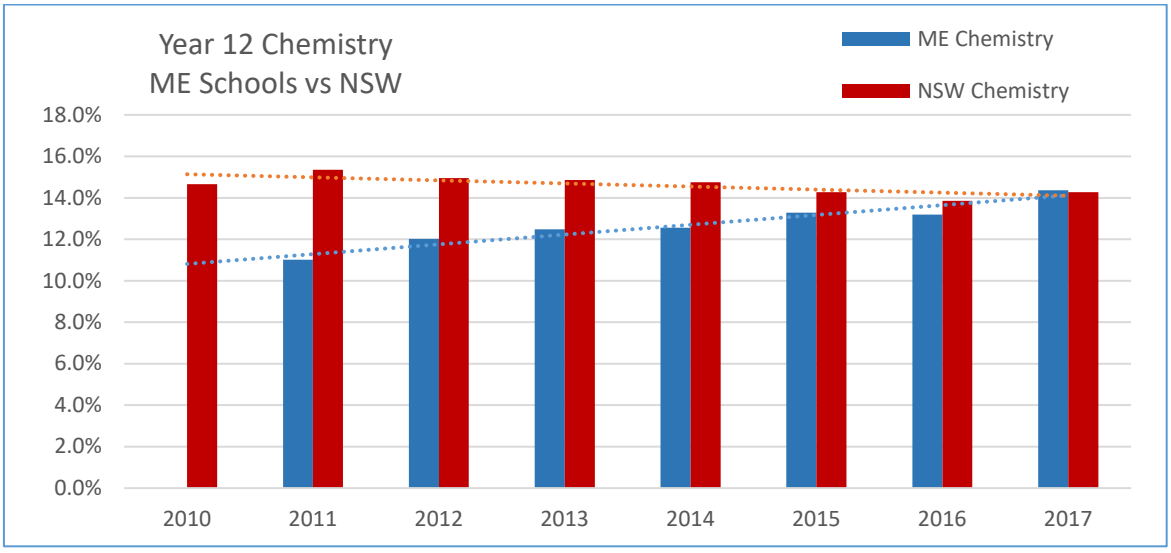
Due to the maturity of the ME Program in the Hunter region, a data study has been conducted on **Year 12** enrolments in schools that have shown consistently high engagement with the ME Program since 2011. These "Group 1" schools represent the three school sectors (DET, Catholic and Independent) and have a typical yearly total cohort of approximately 1200 students.

This new data is significant as it illustrates whether these Group 1 students making STEM subject choices over 2011 – 2017 are ***maintaining their interest and staying in the subject*** in Year 12.

Dropping difficult STEM subjects such as Physics or Software design in Year 12 may have been expected, but the data generally show ME Program Group 1 school students are sticking with their choices significantly better than the NSW average.

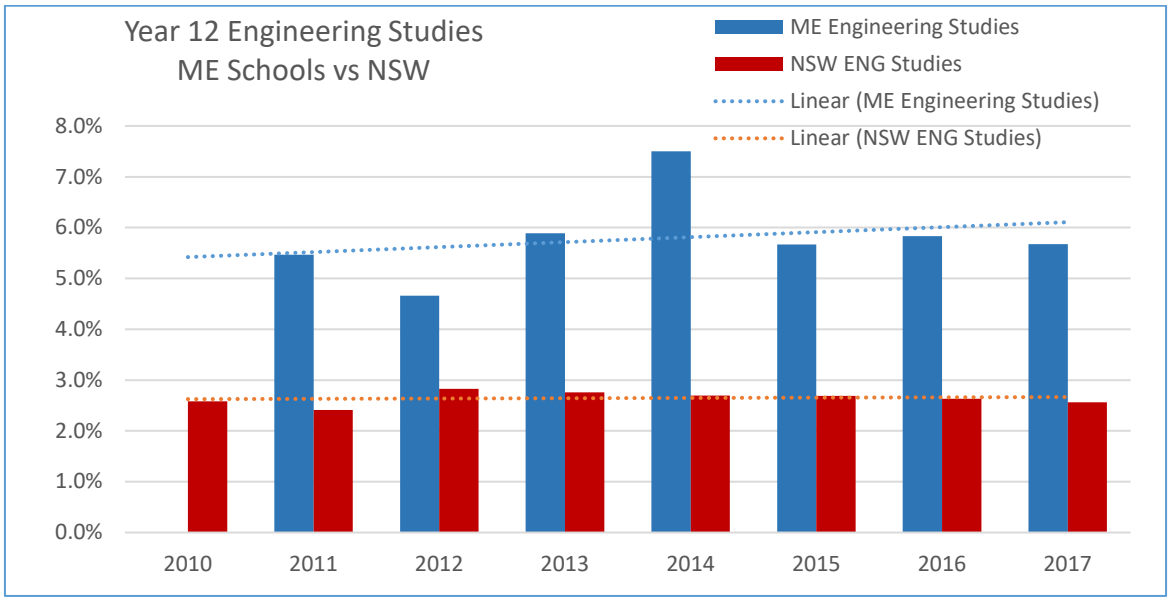
The subject examples of Chemistry, Engineering Studies, Mathematics Extension 1 and Software Design and Development have been monitored and outcomes analysed.

Figure1: 2017 Year 12 Chemistry enrolments ME Schools vs NSW (%)



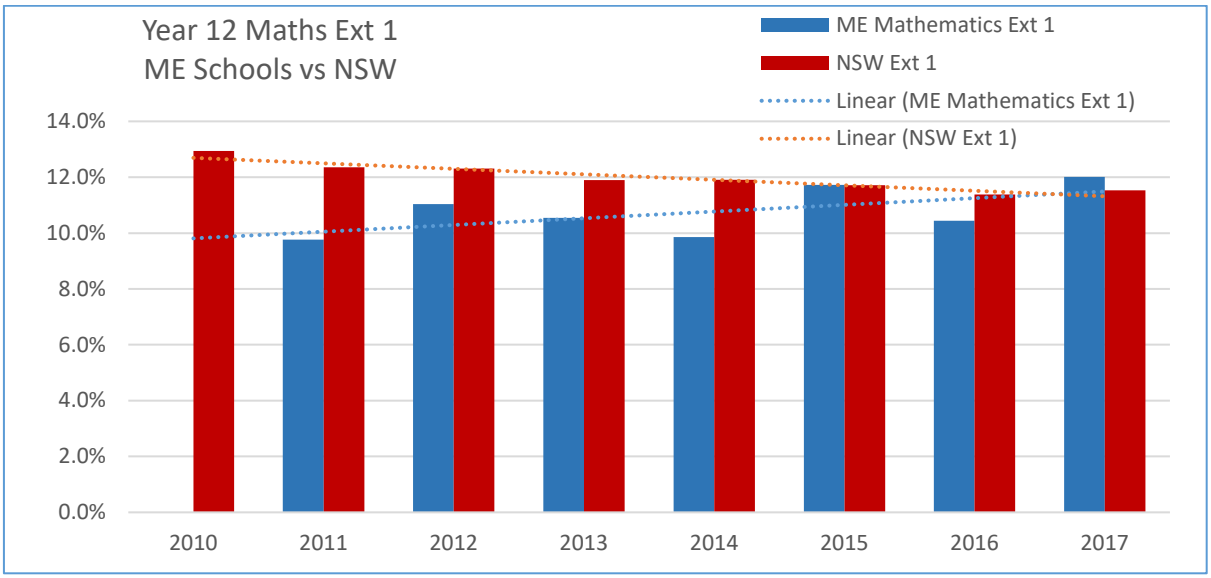
Year 12 enrolment data repeats this trend - ME Program Group 1 schools increasing significantly while Year 12 NSW enrolments decline.

Figure 2: 2017 Year 12 Engineering Studies enrolments ME Schools vs NSW (%)



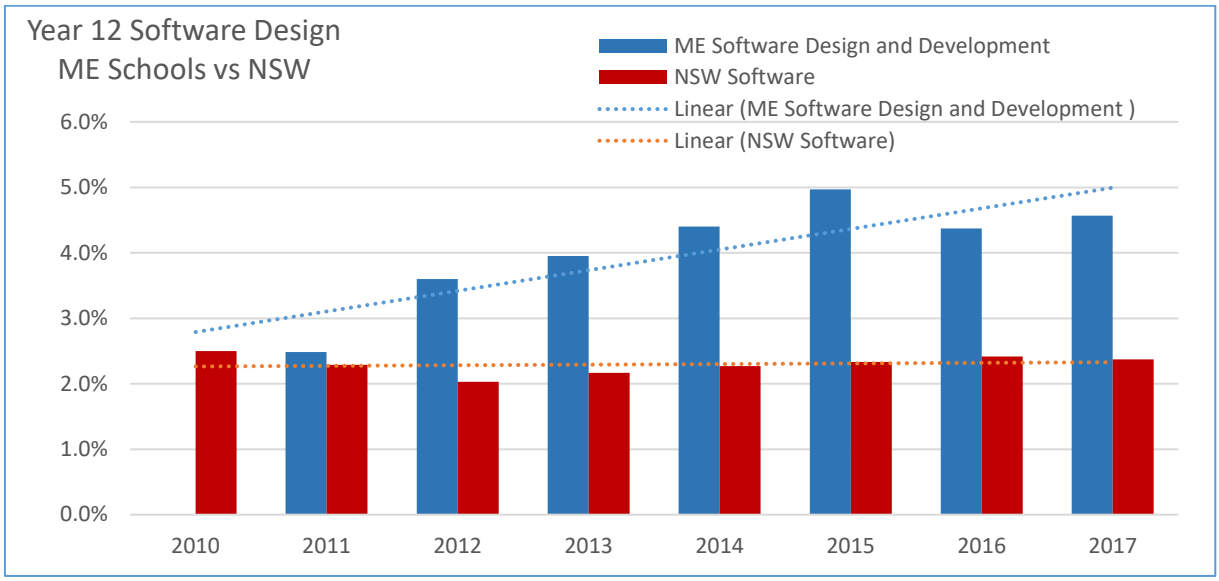
Year 12 enrolment data repeats this trend - ME Program Group 1 schools increasing while Year 12 NSW enrolments remained flat.

Figure 3: Year 12 Maths Ext 1 enrolments ME Schools vs NSW (%)



Year 12 enrolment data repeats this trend - ME Program Group 1 schools increasing while Year 12 NSW enrolments decrease.

Figure 4: Year 12 Software Design enrolments ME Schools vs NSW (%)



Year 12 enrolment data repeats this trend with a very large increase (almost 70% increase in trendline) for ME Program Group 1 schools while Year 12 NSW enrolments remain flat.

The above results for Group 1 ME Program schools, covering cohorts of over 1200 students show significant improvements in STEM enrolment are being maintained as students complete their two-year HSC study. The initial Year 11 STEM subjects chosen by students, which have been encouraged and supported through participation in ME Program initiatives, are maintained over 2 years of study.

APPENDIX B: RDA AND THE HUNTER REGION

RDA Hunter

Regional Development Australia Hunter is part of a national network of locally based economic development organisations. RDA Hunter is well-served by a Board comprising experienced local leaders who work with governments, regional organisations, businesses and community groups to grow a strong and confident regional economy.

RDA Hunter has a mandate to provide independent and impartial advice directly to governments on priorities and to provide strategic and targeted responses to issues affecting the Hunter. By taking the lead role on initiatives and collaborating with local stakeholders, RDA Hunter supports:

- Economic growth and Productivity gains;
- Jobs and a Skilled Workforce for the future;
- Federal, State and Local Government programs that have a regional impact;
- Local businesses and industries developing globally competitive advantages; and
- Hunter competitive advantages to seize economic opportunities and attract investment.

Our activities and initiatives support three strategic areas: **investment**; **infrastructure**; and **innovation**. RDA Hunter's actions cultivate inter-connections between these strategic themes to help meet the regional development goals of Commonwealth, State and Local governments.

The Hunter – A Region of Economic Strength

The Hunter is located north, north-west of Sydney. For statistical purposes, the Hunter is often represented as two regions: *Newcastle and Lake Macquarie* and *Hunter Valley exc. Newcastle*.

At a government level, the Hunter currently contains 6 Federal electorates, 10 State electorates and 10 local government areas.

Map of the Hunter Region, NSW Planning & Environment

Hunter Regional Plan 2036, page 62

The Hunter is widely known as a major centre for mining and resources with a history of large-scale heavy industry, coal exports and shipbuilding. However, it is the small and medium enterprises (SMEs) sector which constitutes the majority of businesses in the region.

RDA Hunter commissioned Deloitte Access Economics to analyse economic data and report on possible impacts of various trends and scenarios on the Hunter's future. In *Prospects and Challenges for the Hunter Region – a strategic economic study*[1] it is forecast that by 2036, the Hunter's economy will have grown by about 75 per cent, to be delivering a Gross Regional Product of $64.8 billion.

Hunter's Population

The Hunter is home to over 860,000 people; around 9% of NSW population. Most of the population of the region lives within 25 km of the coast, with 54.4% of the Hunter's population living in the Newcastle and Lake Macquarie Local Government Areas (LGAs).

In the year to 30 June 2016, the significant urban areas of the Hunter generally experienced population growth slightly below the 1.4% state average. Highest growth was in the southern parts of the region; Morisset – Cooranbong, up 1.7% on 2015 numbers. This was followed by Muswellbrook, up1.5%, three areas with an increase of 1.3% for the year (Cessnock, Forster - Tuncurry and Nelson Bay – Corlette), hen Newcastle – Maitland, up 0.9%. Almost zero growth around Kurri Kurri – Weston (0.3%) and negative growth in Singleton, -0.2%.[2] This follows the national pattern of population losses in mining areas and mining service centres. Fourth largest growth for a NSW SA2 area outside of Sydney was Maitland – West, with 550 new residents.

Hunter Comparative Advantages and Economic Highlights

The region's natural comparative advantages, include proximity to Sydney, deep water sea port, fresh water rivers, productive lands and a diverse supply of resources.

The Hunter is the major region for economic activity in New South Wales:

- At least 130,000 additional people are expected to be living in the region by 2036;
- Gross Regional Product for 2016 of $41.3 billion, ranking above Tasmania, NT and ACT;
- Contributing more than 8 per cent of Gross State Product and 2.6 per cent of GDP;
- In 2016, the Port of Newcastle's total trade value was $18.69 billion from 167.7 million tonnes in throughput, for 25 cargoes; third largest total volume port in Australia;
- Producing upwards of 60 per cent of the electricity for the State of NSW.
- Significant investment in Defence facilities particularly at RAAF Base Williamtown and Infantry Army Barracks and Special Forces Training Centre at Singleton; and,
- Re-emerging shipbuilding capabilities, including Navy sustainment programs.

The Hunter's positive economic development will be built on the region's capacity to:

- Grow through the attraction of investment and talent;
- Construct the economic infrastructure required to maximise its comparative advantages;
- Secure smart partnerships to overcome challenges and commercialise opportunities; and,
- Energise its innovation system to support internationally competitive businesses.

– End –

[1] The Deloitte Access Economics report is available at: http://www.rdahunter.org.au/ under 'Initiatives'.
[2] *Reference: 3218.0 - Regional Population Growth, Australia. ABS. March 2017*