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Healthy Rivers Project - Comment on Employment and Vibrant Resilient Communities Indicators

This report was commissioned by the Technical Leaders Group for
the Healthy Rivers Wai Ora Project

The Technical Leaders Group approves the release of this report to Project Partners and the Collaborative Stakeholder Group for the Healthy Rivers Wai Ora Project.

Signed by:

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Healthy Rivers Project

Comment on Employment and Vibrant
Resilient Communities Indicators

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1. Introduction

The purpose of this report is to provide a review of the community resilience and labour market indicators proposed for use in monitoring the impact of the Healthy Rivers project on the communities and individuals of the Waikato river catchment. There is a particular emphasis on identifying additional measures that might be incorporated in the indicator framework.

Details of the Healthy Rivers Project maybe found here

<http://www.waikatoregion.govt.nz/healthyivers/>

We assess the suitability of the indicator framework and any proposed changes across three dimensions:

Effectiveness

- Does the measure have sufficient technical strength to measure the construct it is representative of?
- If so, does it do so in a way that is theoretically defensible and intuitively appealing?

Efficiency

- Does the indicator provide a concise or parsimonious way of measuring the underlying construct?
- If so, does it do this in a way which minimisation of duplication between the measures proposed for each indicators?
- When constructing measures for indicators it is difficult to resist proliferating the number of such measures in an attempt to capture every nuance of a particular construct. This often leads to needless duplication of measures i.e. measures of an indicator are so highly correlated that they convey essentially the same information, increasing the cost of ongoing monitoring and obscuring general patterns.

Accessibility

- Does the data have sufficient time series to make it useful for monitoring and evaluation purposes?
- Using a measure that is only available at one point in time, say as the result of a project that is unlikely to be replicated, or infrequently vitiates its usefulness in monitoring as we are unable to ascertain if it has changed over time.

The rest of the paper will be structured as follows, section 2 covers the main sources of data that might be used at the sub-national level while section 3 considers the measures and indicators that have been proposed, suggesting some additional or alternative measures.

Section 4 makes some general comments regarding the Social Indicator while section 5 is by way of conclusion.

2. Data Sources

To monitor the impact of the Healthy Rivers project on the communities and individuals of the Waikato river catchment will require consideration of data at a customised spatial level. This spatial frame is one of the greatest barriers to data availability, as New Zealand social surveys are rarely powered for analysis at the sub-national, let alone sub-regional, level. This means that monitoring the community resilience and labour market impacts of the Healthy Rivers project will be limited both in terms of the range of variables available, and the timeliness of their availability.

There are two main sources of monitoring readily available without new data collection. They are Survey data and Administrative data. Survey data is obtained through surveying a sample or census of the population, and aims to describe population properties. Survey data is particularly useful for social analysis as the questions asked are often specifically designed to elicit self-reported attitudinal or behavioural information. Also available is Administrative data. Administrative data is data which is primarily collected for administrative reporting and planning purposes, and is usually focused on transactions or events. Administrative data is limited in scope, but is particularly useful as it is regularly updated.

The primary source for reliable survey and administrative data in New Zealand is Statistics New Zealand. In particular, the Official Statistics collections of survey and administrative data are both reliable and accessible¹.

Survey data

Census²

The New Zealand Census is the “flagship” product of Statistics New Zealand, and part of the Official Statistics collection. Held once every 5 years the census covers the whole population collecting data on a wide range of variables which are made available at a low level of spatial disaggregation. Due to the size of the census, the data is able to be disaggregated to a very low spatial frame. Because of this, the data from the census provides the backbone for sub-national and sub-regional demographic and labour market statistics.

As well as being accessible at a low level of spatial disaggregation, the census is also the only source of data for labour market relevant topics such as internal migration and travel to work data.

¹ http://www.stats.govt.nz/about_us/who-we-are/home-statisphere/official-statistics-oss.aspx

² <http://www.stats.govt.nz/Census.aspx>

While central to the understanding of regional New Zealand the Census, one of the major drawbacks is the length of time between each census. These gaps mean that it will take at least a decade to gain three data points required to begin to understand trends. Despite this drawback, the census remains an essential tool for understanding baselines and impacts.

The following variables related to work and income are freely available from the census:

- Respondent's availability for work
- Respondent's hours worked
- Respondent's industry
- Respondent's job search methods
- Respondent's main means of travel to work
- Respondent's occupation
- Respondent's whether or not the respondent is seeking work
- Respondent's sources of personal income
- Respondent's status in employment
- Respondent's total personal income

A useful guide to the various variables available is to be found in Errington et al (2008).

In addition to these variables there are a number of census based indexes, such as the New Zealand Deprivation Index (NZDep, see Salmond et al (2007,2013)), New Zealand Socio-Economic Index (NZSEI, see Milne et al (2013)) and the infrequently used New Zealand Index of Neighbourhood Social Fragmentation (NeighFrag, see Ivory (2012)).

Household Labour Force Survey (HLFS)³

The Household Labour Force Survey (HLFS) provides a regular, timely, and comprehensive portrayal of New Zealand's labour force. Each quarter, the HLFS produces a range of statistics relating to employment, unemployment, and people not in the labour force. HLFS results are based on a representative sample of 15,000 households and about 30,000 individuals throughout New Zealand (SNZ, 2015a).

The objectives for the HLFS are to (SNZ, 2015b):

³ <http://www.stats.govt.nz/survey-participants/a-z-of-our-surveys/household-labour-force-survey.aspx>

- Measure the levels, changes, and characteristics of employment, unemployment, and people not in the labour force in New Zealand on a regular basis - using international guidelines and best practice.
- Produce reliable national and subnational estimates of the employed, unemployed, and not in the labour force (NILF) groups over time
- Produce reliable estimates of change in national and subnational estimates of the employed, unemployed, and NILF groups over time
- Collect and produce supporting information to describe, monitor, and explain the state of the labour market (e.g. hours of work, status in employment, duration of unemployment)
- Collect and produce information about the structure and characteristics of the employed, unemployed, and NILF groups.
- Collect and produce information on topics relevant to labour market data, such as qualification level and involvement in education. This may include regular and irregular attachment of topics covering labour market-related information.

The specific outputs of the HLFS are estimates of the number of (SNZ, 2015b);

- People employed, unemployed, and not in the labour force – actual, seasonally adjusted, and trend
- Total people employed, unemployed, and not in the labour force – by age group, ethnic group, and regional council area
- People employed – by sex, and industrial activity of place of employment
- People employed full-time and part-time – seasonally adjusted
- The jobless (those without a job or wanting a job)
- Total usual and actual hours worked
- Underemployment or underutilisation
- People aged 15-24 years not in education, employment, or training (NEET).

The last of these outputs (NEET) is of particular interest given the impact of the global financial crisis on the youth labour market (Junankar, 2014) and the importance of attachment to the labour market for the future outcomes of youth (Wyn, 2015).

The largest draw back to the use of HLFS data for this project is that the HLFS outputs are not available below regional level. This largely due to the size of the HLFS sample – the Waikato region has around 10 percent of the countries working age population so it would be expected that around 3000 people would be surveyed of which around 200 respondents would be unemployed. Disaggregating further would involve unacceptably small numbers of respondents. Clearly this problem would be more extreme if we attempted to disaggregate unemployment, for example, by various demographic characteristics such as ethnicity.

Linked Employee Employer Data (LEED)⁴

LEED uses existing administrative data drawn from the taxation system, together with business data from Statistics NZ's Business Frame (BF). The LEED dataset is created by linking a longitudinal employer series from the BF to a longitudinal series of Employer Monthly Schedule (EMS) payroll data from Inland Revenue (SNZ, 2014). The primary purpose of LEED is to provide insight into the operation of the New Zealand labour market. It differs from data sources such as the census and HLFS in its focus on the dynamics of the labour market rather than its cross sectional attributes i.e. it tries to capture things like job creation and destruction rather than the employment rate.

While LEED measures are available with a quarterly periodicity there is usually a lag of around 2 years in releasing data primarily because while employers are obliged to submit EMS on a monthly basis it frequently takes considerably longer thereby delaying the availability of the data.

The fundamental basis of LEED is the concept of a "job", defined as a unique employer-employee pair present on an EMS in the reference quarter however the annual LEED tables are somewhat broader incorporating various social assistance payments such as paid parental leave, student allowances, benefits, pensions and ACC payments.

The quarterly statistics include all jobs that meet the following criteria:

- Relate to a person 15 years of age and over
- Have PAYE tax deducted at source
- Be in relation to 'paid employment' rather than a social assistance payment
- Have a valid IRD identifier.

This largely excludes employers and the self-employed though it does include a small number of such persons who decide to pay their tax at source.

The LEED quarterly tables contain data on the following variables at Territorial Authority and/or Regional Council level;

- Mean earnings of full quarter jobs
- Mean earnings of continuing jobs
- Mean earnings of new hires
- Mean earnings ratio (%)
- Median earnings of full quarter jobs
- Median earnings of continuing jobs
- Median earnings of new hires

⁴ http://www.stats.govt.nz/browse_for_stats/income-and-work/employment_and_unemployment/leed.aspx

- Median earnings ratio (%)
- Total filled jobs
- Worker accessions
- Worker separations
- Worker turnover rate (%)
- Jobs creation
- Job destruction
- Total earnings

A full set of definitions of these variables and the accompanying commentary from Statistics New Zealand (2014) is included in Appendix 1

In addition to the flat one way tables of variables at Regional Council level a number of multi-way tables are available;

- LEED measures by age and region
- LEED measures by sex and region
- LEED measures by sector and region
- LEED measures by industry (based on ANZSICo6) and region
- LEED measures by region and firm size
- LEED measures by age, sex and sector
- LEED measures by age, sex and region
- LEED measures by age, sector and region
- LEED measures by age, industry (based on ANZSICo6) and region
- LEED measures by age, region and firm size
- LEED measures by sex, sector and region
- LEED measures by sex, industry (based on ANZSICo6) and region
- LEED measures by sex, region and firm size
- LEED measures by sector, region and firm size
- LEED measures by industry (based on ANZSICo6), region and firm size

The LEED annual tables cover 5 topics;

- Source of Income
- Income Transitions
- Income Source Spells and Job Tenure
- Holders of Multiple Jobs
- Self-employment

These tables are often disaggregated to regional level and complement the quarterly tables. Additional tables involving custom cross tabulations and disaggregation's may be purchased from Statistics New Zealand however these are likely to be subject to a considerable amount of data suppression and confidentialisation if requested at highly disaggregated levels.

In principle it would be possible to disaggregate the LEED data to area unit level however MBIE/IRD are unwilling to do so as the quality of the match between individuals and area unit is poor due to individuals reporting a post office box, private bag or the address of their tax agent instead of their physical residential address.

Business Demography Statistics⁵

Business demography statistics provide an annual snapshot (at February) of the structure and characteristics of New Zealand businesses. The series covers economically significant enterprises that are engaged in producing goods and services in New Zealand Economically significant includes all enterprises with GST turnover greater than \$30,000 per year (SNZ, 2007). The data used in these tables are drawn from the Longitudinal Business Frame (LBF) which in turn is made up of data drawn from the Statistics New Zealand's Business Frame (BF), the predominate source, and payroll tax records drawn from the Linked Employer-Employee Database (LEED). Of particular use are the geographically disaggregated tables:

- Geographic units by region and industry 2000-14,
- Geographic unit's births and deaths by territorial authority and industry 2001 -14,
- Geographic units by employee count size, industry and area unit 2000-14.

The term geographic unit being defined as "a separate operating unit engaged in New Zealand in one, or predominately one, kind of economic activity from a single physical location or base", what might be thought of as a worksite i.e. an enterprise may consist of multiple geographic units (SNZ, 2007).

While the disaggregation to area unit level offers a unique insight into the low level distribution of workplaces and employment Statistics New Zealand caution that "The BF, which is the main source of data for the business demography series, is designed to support quality national level statistics. It is not designed to provide quality fine level regional or industry statistics. Particularly for small and medium-sized businesses, the BF update sources can have timing lags and less robust information. These quality weaknesses can be highlighted in fine-level business demography statistics" (SNZ, 2007)

⁵ http://www.stats.govt.nz/browse_for_stats/businesses/business_characteristics/nz-business-demography-statistics-info-releases.aspx

Administrative Data

A number of government agencies maintain large data sets acquired in the course of performing their statutory duties. The Ministry of Social Development (MSD) and the Ministry of Business, Innovation and Employment (MBIE) hold large amounts of data on the use of the social security system and sub-national economic conditions while the New Zealand Police (NZP, resource allocation to point location), District Health Boards (health data to census area unit level) and Ministry of Education (MoE, educational attainment and governance data to school level).

While a detailed review of the vast number of outputs from administrative data would be beyond the scope of this paper we would point to 3 easily accessible outputs that may be of use in understanding the region, and its labour market in particular:

Ministry of Social Development Benefit Count Data

MSD make publicly available quarterly counts of benefit receipt (MSD, 2015) by benefit type and selected beneficiary attributes aggregated to a number of different geographic boundaries;

- National
- Regional Council
- Territorial Authority
- Work and Income Region
- Auckland Community Board
- Work and Income Service Centre

In addition, on request, count data can be made available at census area unit level though around 15 percent of claimants cannot be assigned to an area unit⁶.

The main characteristics of beneficiaries reported by benefit type are gender, ethnicity, age group (18-24, 25-39, 40-54, 55-64 years) and the continuous receipt of any of the main benefits (1 year or less/ More than 1 year).

Ministry of Business, Innovation and Employment Regional Economic Activity Report (MBIE, 2015)

MBIE's regional economic activity report covers a wide range of economic indicators at the Regional Council and, for selected variables, Territorial Authority level. The report is

⁶ This is based on our experience of using area unit level benefit counts. The problem arises in part due to the frequent movement of claimants between residential addresses.

available in printed and web format and is supported by an easy to use web tool as well as a mobile app. This particular publication brings together a wide range of data from the sources mentioned above and in addition includes some variables that are the product of MIBE's own modelling. A list of the variables available from this source is contain in appendix 2.

Ministry of Education collections

Via the EducationCounts website (<https://www.educationcounts.govt.nz/indicators>), the MoE has made available a range of indicators at Regional Council or Territorial Authority level including:

- Early leaving exemptions
- Kōrero: primary schooling
- Mathematics/Pāngarau: primary schooling
- Māori parent representation on the boards of trustees
- Non-enrolled Students
- Participation in early childhood education
- Pasifika parent representation on the boards of trustees
- Provision of early childhood education services
- Reading/Pānui: primary schooling
- Research degree completion rates
- Retention of students in senior secondary schools
- School leavers with NCEA Level 1 or above
- School leavers with NCEA Level 2 or above
- School leavers with NCEA level 3 or above
- Teachers in early childhood education
- Transient students
- Truancy from school
- Writing/Tuhituhi: primary schooling
- Youth suicide (by DHB)

Much of this data, and more, is available through the "Know Your Region" web tool (<https://www.educationcounts.govt.nz/know-your-region>) which not only allows the extraction of data but the comparison of Regions/Territorial Authorities with the national level indicator.

3. Proposed Social Indicators

Community health and resilience

There is significant national and international public and policy concern about considerable variability in the health and resilience of New Zealand communities (e.g. National Business Review, 2014; Tallon, 2013). Community health and resilience is multi-dimensional: a healthy and resilient community is prosperous (across a range of dimensions), liveable (for a diverse population), as well as being environmentally, socially and economically sustainable. This concern about community success is linked to the view that the potential of individuals and families/whanau cannot be fully realised if they are living in places that are under-performing economically and are under-developed socially, culturally, environmentally and in relation to infrastructure.

While policy makers in central and local government have increasingly acknowledged the importance of community health and resilience, precious few methods of monitoring and evaluating the impacts of change on communities have been identified, particularly in very small communities of less than 10,000, where small number mean that nationally collected statistics are often not collected or heavily suppressed, making their use problematic.

This lack of available data is evident in the description of the current situation or baseline description, where much of the discussion is qualitatively driven.

Food security

With the availability of imported goods, it is unlikely that food security will be impacted. However, reduced production may result in food affordability issues both locally and nationally due to the loss of horticultural land. However, it seems unlikely that improving water quality will sufficiently impact horticultural land in a way which will threaten food affordability for the communities in the Waikato river catchment. Indeed, land conversion from agriculture to horticulture may result in increased availability of horticultural goods within the region.

If sufficient concern was placed on food affordability, then primary data collection would be required to monitor the cost of a 'bundle' of horticultural products relative to current costs, and adjusting for national changes in fruit and vegetable prices.

Population size and change

The best measure of small-area population size is the Census Usual Resident Population count, and demographics. However, the Census is currently produced at five year intervals, making timely monitoring of population change in the small communities of the Waikato river catchment problematic. In order to track population change during inter-census periods, councils could monitor dwelling occupancy using rates data and new housing consent data to estimate if demand for housing is stable or changing between census periods. Combining this information with small-area unit projection techniques may allow for robust estimates of population change. However, the time and cost involved in this inter-census monitoring is unlikely to be an efficient use of resources.

School children/Aging

As mentioned above, the best source of demographic data at the low spatial level required for monitoring in Waikato river catchment communities is the Census. Using census data, it is possible to monitor the number of school aged and older persons in each community by calculating and monitoring using two ratios:

Dependency ratio: This ratio provides an estimate of the burden of dependency on the population engaged in productive activity. It is calculated as those who are potentially dependent (the sum of those aged 0-14 and aged 65+), divided by those who are potentially engaged in productive activity (the sum of those aged 15-65) within a given area.

$$\text{Dependency ratio} = \frac{(\text{Population aged 0 to 14} + \text{Population aged 65+})}{\text{Population aged 15 to 65}}$$

Entry/Exit ratio: The ratio of people entering the workforce (aged 15-29 years) to those leaving it (aged 55-69 years) for a given area. This ratio provides an estimate of the sustainability of the local labour force through local demographic factors alone (migration is external to the ratio). It is calculated using the following formula:

$$\text{Entry Exit Ratio} = \frac{(\text{Population aged 15 to 29 years})}{(\text{Population aged 55 to 69 years})}$$

Social connectedness

Social connectedness is closely related to concepts of social capital, which is the concept that linkages between people provide a range of benefits including:

- Increased **economic** wellbeing, through information flows allowing people to make more efficient decisions and adopting new innovations.
- Increased **Social** wellbeing through satisfying the need for interpersonal contact social interactions, and also providing a form of recreation.
- Better **Governance** through increased participation and engagement with local initiatives.

Some potential survey data sources for Social connectivity/capital data at a subnational level include:

The **New Zealand General Social Survey** (Bi-annual survey, Statistics New Zealand). The NZGSS contains a rich range of social capital variables. However, the small number of participants (approximately 7,000 to 8,000 per survey) is insufficient to allow the release of data below the Regional Council level. A related survey, **Te Kupenga** (currently 2015, 2018, Statistics New Zealand), was an adaptation of the NZGSS, sampling 5,500 people who identified as having Māori ancestry, with questions designed with a unique Māori focus. However, again the relatively small sample size restricts the use of this data below the Regional Council level.

The **World Values Survey** (<http://www.worldvaluessurvey.org/wvs.jsp>) also has a rich range of social capital measures, including interpersonal trust, volunteering and participation. However, the infrequent nature of the survey makes it unreliable for monitoring purposes. The data is available at Territorial Authority level. The tri-annual **New Zealand Electoral Study** (<http://www.nzes.org>) and bi-annual **Quality of Life Project** (<http://www.qualityoflifeproject.govt.nz>) also contain information on social connectivity and cohesion, but both lack sufficient sample sizes for monitoring at a low spatial level.

The **Census** is perhaps the only survey which contains social connectedness and social capital data which will be available at a small spatial scale. The Census question asking whether people have done work for a voluntary organisation in the past four weeks is a reliable measure to a small spatial frame.

While timeliness and small sample size limits the availability of accessible survey data, there does exist several administrative data sources which may provide suitable proxy measures of social capital in communities. In particular, Police crime statistics could be used to monitor the rate of antisocial crimes per 1,000 population. Council responses to noise complaints or vandalism/graffiti and other antisocial events may also provide a measure of social health.

Comments on the Vibrant and Resilient Communities Indicator

As discussed, many of the proposed indicators for Vibrant and Resilient Communities lack a sound theoretical linkage between proposed changes to the river catchment and meaningful change in the community. In particular, food security and demographic structural change are likely to be largely driven by external factors, and accessing data (outside of the census for demographic change) is likely to not be a cost-effective use of resource.

The primary challenge of monitoring and evaluating community health and resilience will be meeting the criteria of *accessibility*. There is a distinct lack of variables relating to social attitudes and behaviours below the Regional Council level which are available in a timely fashion suitable for monitoring and evaluation. Preferable may be the use of administrative data, such as frequency of responses to antisocial events (Police, Council) or membership

data from local sports or social clubs may provide more timely data at a geographic level suitable for monitoring the catchment area.

Effectiveness and *Efficiency* concerns will likely be driven by the availability of data. There is such scarcity that, particularly at a low geographic level of disaggregation, for monitoring purposes there is unlikely to be sufficient choice for either to be a concern. Effectiveness will largely be driven by theoretical linkages between available measures and social cohesion/connectivity/capital, drawing on the wealth of international and national publications on the topic (e.g. Roskrugge (2014)).

Employment/Labour Market

The measures used in the employment indicator appear to have been largely drawn from official series though which ones specifically is not clear.

Employment rate

The employment rate is defined as;

$$\text{Employment Rate} = \frac{100 \times \text{Number of People Employed}}{\text{Working Age Population}}$$

Where the working age population is the usually resident, non-institutionalised, civilian population aged 15 years and over and the number of people employed is the count of all those who;

- Worked for one hour or more for pay or profit in the context of an employee/employer relationship or self-employment
- Worked without pay for one hour or more in work which contributed directly to the operation of a farm, business, or professional practice owned or operated by a relative
- Had a job but were not at work due to: own illness or injury, personal or family responsibilities, bad weather or mechanical breakdown, direct involvement in an industrial dispute, or leave or holiday. (SNZ, 2015c)

The employment rate maybe a better measure of labour utilisation than the unemployment (although it would be usual to report both along with the participation rate). This arises due to the restrictive definition of unemployment;

“all people in the working-age population who, during the reference week, were without a paid job, available for work, and had either actively sought work in the past four weeks ending with the reference week, or had a new job to start within the next four weeks.” (SNZ, 2015c)

This definition clearly excludes those who are not actively seeking but who would take a job if offered one or choose not to enter the labour market due to economic conditions.

Employment by sector

This is readily available from either the census or the HLFS or, if one is only interested in employees LEED or the Business demography statistics. The choice between these is largely dictated by the level of geographic aggregation, periodicity and whether the self-employed are to be included or not.

It should be noted that while sectorial employment is commonly reported in ANZSICo6 categories Statistics New Zealand has indicated that it will increasingly report Industry statistics following the New Zealand Standard Industry Output Categories (NZSIOC). These are largely aggregations of ANZSICo6 categories (SNZ, 2013) – a full list of the classification ANZSICo6 New Zealand Standard Industrial Output Categories (NZSIOC) is here; <http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/industrial-classification.aspx>

Note also that the industrial classification may not map neatly on to the idea of a sector, for instance the dairy “industry” is made up of a number of ANZSICo6 categories, Agriculture (Dairy Cattle Farming), Manufacturing (Dairy Product Manufacturing) and part of Administrative and Support Services (Packaging Services) amongst others making it difficult to track employment within a value chain over time.

Employment growth

Employment growth can be calculated in a straight forward manner using the employment sector data however it should be calculated on a period of at least a year to account for

seasonal effects. Ideally though this rate should be calculated in such away as both seasonal, cyclical and trend effects⁷ are accounted for.

Comments on the Employment Indicator

As noted in section 2 above there are a number of different sources for labour market with a plethora of variables and measures available. The choice of which depends both on the purpose, the desired periodicity of measurement and the geographic scale required. If data is required at the regional level the measures available from the HLFS would largely suffice – i.e. unemployment, employment and participation rates plus employment by industry and the NEET rate. These could be supplement by LEED data – particularly the turnover rates and job creation/destruction and the Business Demography Statistics (which would give some insight into firm dynamics by monitoring the number and size of geographic units)

If the level of aggregation desired is at the Territorial Authority level then the HLFS would be unavailable however the LEED and Business Demography Statistics would be. If the employee counts from these sources were modified to allow for the self-employed – perhaps by applying a fixed percentage derived from the census or annual LEED tables or by adding the number of zero employee geographic units to the employee counts, then a reasonable approximation to the total number employed could be obtained.

While NEET figures outside census years would not be available at Territorial Authority level some grasp of the employability of you could be gained from the MoE data, in particular the measure of the number of school leavers who have not obtained level 1 qualifications. These school leavers being particularly prone to detachment from the labour market (McPherson, 2011).

The Business Demography Statistics are available at census area unit level allowing the development of employment and geographic unit counts, albeit subject to the Statistics New Zealand caveat noted earlier, to non-standard areas. Hence if desired this data could be

⁷ Statistics New Zealand usefully discuss the resolution of time series into seasonal, cyclical and trend components here http://www.stats.govt.nz/browse_for_stats/environment/environmental-economic-accounts/seasonal-adjustment-within-statistics-new-zealand.aspx

aggregated to the specific boundaries of interest providing greater precision than that obtain by using Regional Council or Territorial Authority data.

4. General Comments

Section 2 outlines some of the sources of data on the socio-economic characteristics of the Waikato. If the objective is to obtain a set of baseline indicators that can be monitored over time and a mix of Territorial Authority and Regional Council level data is acceptable we would recommend using the freely available Regional Economic Activity Reports that has thus far been published in 2013, 2014 and 2015. As can be seen from appendix 2 the Activity Report covers most of the suggested economic, labour market and vibrant and resilient community's indicators along with a number of other salient measures.

We would supplement the Regional Economic Activity Reports measures in several ways;

- Firstly, from the Business Demography Statistics we would include the geographic unit's births and deaths data to capture some of the firm level dynamics in the region. In addition there exists data from the New Zealand Insolvency and Trustee Service (<http://www.insolvency.govt.nz/cms/site-tools/about-us/statistics/insolvency-statistics/monthly-bankruptcy-figures>) on the number of bankruptcy adjudications which might serve as an indicator of prevailing business conditions though we believe that in its published form this is not particularly useful.
- Secondly complement the NEET data with the MoE data on school leavers qualifications to better track vulnerable youths.
- Thirdly the MoE data contains statistics relevant to cultural attachment (Māori language attainment by school pupils) and representation (Māori parent representation on the boards of trustees) which could be included.

While the Regional Economic Activity Reports could provide an all-encompassing framework if, as noted in the comment on the Employment Indicator, Regional Council level data was acceptable and higher than annual frequency is required the standard HLFS measures would suffice for the employment indicator. The HLFS data could be supplemented by selected variables from LEED, notably the turnover rate which is another measure of the general state

of the labour market (see for instance Lazear & Spletzer (2012)) along with job creation and job destruction rates.

There are 3 other matters which we wish to raise based on our reading of the documentation provided.

The use of the New Zealand Deprivation Index (NZdep).

While NZdep decile is often given for areas of Territorial Authority and above the measure does not make much sense above census area unit level as it is a small, approximately mesh block, area measure of deprivation (Salmond et al, 2007:2014). As the size of the area considered grows it comes to contain multiple small areas and spatial heterogeneity becomes an obstacle to sensibly interpreting the number. Care must also be taken when calculating the average NZdep decile of an area containing many small areas as the NZdep deciles are an ordinal, not a ratio scale (see figure 1 for the relation between the NZdep index and NZdep scores). That is to say an area with a deprivation index of 4 is more deprived than one with a deprivation index of 2, but not twice as deprived.

In our view it makes more sense when considering a large area to quote the percentage of people who live in constituent small areas with a particular NZdep Index (see table 1).

The importance of providing time series context for measures.

Citing measures such as the employment rate at one point in time difficult as there is no indication of the variability of the measure overtime or whether or not the measure is relatively large or small hence measures should where possible be shown as a series with, preferably, a natural comparator (say the national level) added.

The relative size of the projected impacts and the nature of risk.

While in no way questioning the economic modelling it would be interesting to see some indication of the relative size of the estimated decline in employment of -2.7 percent i.e. is this large compared to observed variation in the regional labour market. Taking the change between one quarter and the same quarter a year later (HLFS 1986Q1-2015Q2) the largest observed change in the period 1986Q1 to 2015Q2 was +8.9 percent (1994 Q2- 1995 Q2) while the smallest was -5.8 percent (1991Q2-1992Q2). Similarly the number of persons employed in the Waikato Region rose by 38 percent in the 1986Q1 to 2015Q2 period i.e. -2.7 percent

change in employment long run is small compared to the historically observed variation in employment levels.

Lastly and following from the above it should be stressed that the changes in employment anticipated in the modelling are from a deterministic model and while that is perfectly acceptable it may convey a sense of certainty that is unwarranted, particularly in the longer term. An example of this is to be found in figure 2 which shows the National Projected Labour Force Characteristics, 2006(Base)-2061 (August 2012 Update). The red dotted line indicates the median projection, approximating a deterministic projection, while the grey bar indicates the 95 percent confidence interval obtained from the stochastic projection. As can be seen from this diagram the median projection is for a national labour force of 3,285,000 however the 95 percent interval is from 2,708,000 – 3,897,000 at 2061. The point here being that our confidence in any measure should decrease rapidly as the period over which it is projected increases.

5. Conclusion

This report has sort to identify a number of data sources that may be of use in expanding or modifying the proposed Social indicators for the Healthy Rivers Project. There are a wide number of potential candidates for inclusion however if regional level data is adequate for the proposed purpose we would advocate using the annual Ministry of Business Innovation and Employments Regional Economic Activity Report rather than commissioning an original piece of work . If the measures used in this report or if there is a need to drill down below Regional Council or Territorial Authority level a number of measures exist that can be aggregated to custom spatial extents though the data quality would be poorer than that at Regional Council or Territorial Authority level.

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Appendix 1 LEED Quarterly Variable Definitions

1. LEED measures are produced as counts of jobs at a point-in-time, or means and medians of earnings for jobs existing for a full quarter.
2. 'Full-quarter' jobs are jobs which exist continuously over the reference quarter.
3. Counts of jobs or workers are taken on the 15th of the middle month of the quarter. This is the 'reference date' concept.
4. Measures relating to means and median earnings are produced using the 'full-quarter' concept. A disadvantage of the point-in-time approach is that the earnings for a job relate to the entire month regardless of the actual days worked. Therefore mean or median earning statistics per job, produced under this concept, would include people who worked one day (or even one hour) in the month with people who worked all month.
5. The total earnings measure uses neither the reference date or full-quarter concepts, and is instead a simple sum of all earnings paid out at any time in the reference quarter.
6. All earnings measures represent quarterly earnings, inclusive of tax, and include payments reported as 'lump sums' to Inland Revenue.
7. Filled jobs and worker flows are rounded using graduated random rounding. Earnings statistics in table builder are rounded to base 10 or base 100 for confidentiality purposes. The different systems used to generate the tablebuilder tables and tables accompanying the release can give rise to some slight discrepancies in the filled jobs, worker flows and earnings statistics.
8. The worker turnover rate is calculated using counts of accessions and separations, which are defined using the reference date concept. Other workers may join and leave during the reference quarter but not be present at either reference date. These workers are not included in the counts of accessions or separations and are therefore excluded from the worker turnover rate.

9. The worker turnover rate is calculated at the geographic unit level, not the enterprise level. This means that employees who transfer between geographic units within an enterprise will be counted as accessions and separations.
10. Patterns in the data: The counts of job creation and destruction; and worker accessions and separations show an obvious seasonal pattern. This pattern is largely caused by the annual update of employee counts on the Business Frame (BF), resulting in larger counts of destruction and creation in one quarter. There is a change in this seasonal pattern from the March 2003 quarter. This is caused by the implementation of a programme to improve the BF maintenance practices and a consequent change in LEED methodology. Methods are being investigated to minimise the changes caused by administrative updating processes.
11. Annual job creation and destruction figures are currently not part of the official set of LEED quarterly statistics. The quarterly job creation and destruction statistics have been designed to explain the change in aggregate jobs between two specific points in time - the 15th of the middle month of their reference quarter and the 15th of the middle month of the previous quarter. They compare job levels at each geographic unit on these two dates. Changes in job levels between these two dates are not included in the statistics. Some users may attempt to produce annual job creation and destruction figures by summing together four quarters of data. This approach is not recommended. Instead Statistics NZ recommend averaging the quarterly job creation and destruction statistics over the year (which is the approach taken in LEED quarterly publications). Estimates of annual job creation and destruction are available on request. They will be incorporated in the LEED table builder statistics in the future, and produced on the same basis as the quarterly series by comparing employers' job levels between two snapshots a year apart. This method produces significantly less job creation or destruction than adding together four quarters worth of data. Summing quarterly job creation and destruction figures can be seen as overstating permanent job creation and destruction by including seasonal and temporary variations in employment. A similar argument can be made against summing four quarters of worker accessions and separations to produce

annual worker flow statistics. However, conceptually it is more appropriate to include seasonal or temporary factors when measuring these worker flows.

12. The worker accessions and separations measures are available from the September 1999 quarter onwards, as this is the first quarter they can be correctly calculated.
13. Due to processing improvements in LEED address data, the number of worker accessions, and separations, and the worker turnover rate for the September 2010 quarter have increased notably from the June 2010 quarter.

Definitions for each measure

Mean earnings of full-quarter jobs:

Mean earnings of all full-quarter jobs.

Mean earnings of continuing jobs:

Mean earnings for jobs which were full-quarter in the reference and previous quarter.

Mean earnings of new hires:

Mean earnings for jobs which were full-quarter in the reference quarter and began sometime in the previous quarter, but were not present in the previous four quarters.

Mean earnings ratio:

The ratio of the mean earnings for new hires to the mean earnings for continuing jobs.

Median earnings of full-quarter jobs:

Median earnings of all full-quarter jobs.

Median earnings of continuing jobs:

Median earnings for jobs which were full-quarter in the reference and previous quarter.

Median earnings of new hires:

Median earnings for jobs which were full-quarter in the reference quarter and began

sometime in the previous quarter which were not present in the previous four quarters.

Median earnings ratio:

The ratio of the median earnings for new hires to the median earnings for continuing jobs.

Filled jobs:

The number of jobs on the 15th of the middle month of the reference quarter.

Job creation:

The number of jobs created, since the previous reference date, when businesses expand or start up.

Job destruction:

The number of jobs lost since the previous reference date when businesses contract or shut down.

Worker accessions:

The number of new employees who have joined employers since the previous reference date.

Worker separations:

The number of employees who have left employers since the previous reference date.

Worker turnover rate:

The ratio of the average of the total accessions and separations, to the average of the total jobs in the reference quarter (t) and the previous quarter (t-1) as represented in the formula:

$$\frac{\frac{(Accessions + Separations)}{2}}{\frac{(Jobs(t) + Jobs(t-1))}{2}}$$

Total earnings:

The sum of all earnings paid in the reference quarter, including employees with invalid IRD identifiers and individuals under 15 years of age.

Social & Income

Household income

Household income distribution

Earnings by industry

Deprivation index

Internet

Housing

Mean weekly rent

Median house price

Mean house value

New dwellings

Workforce

Employment rate

Labour force participation rate

NEET rate

Unemployment rate

Quarterly turnover rate

Employment by industry

Employment by occupation

Education

National standards achievement

NCEA level 2

Population

Population estimates

Population projections

International migration

Population by ethnicity

Population by age group

Rural - urban proportions

Economic

GDP per capita

GDP by industry

Businesses by employees

New building consents

New car registrations

Agriculture

Agricultural share of regional GDP

Area in farms

Tourism

Guest nights per capita

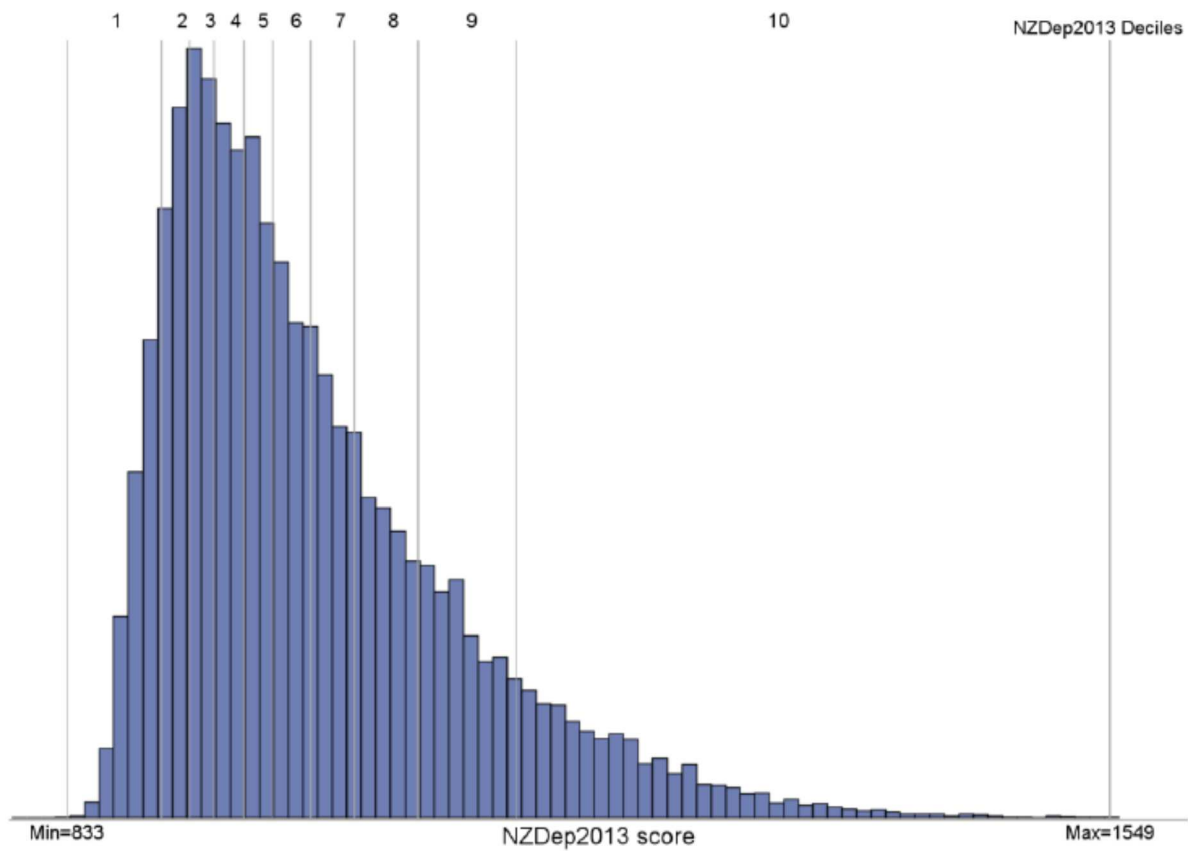
Accommodation occupancy rate

Tourism spend

International guest nights

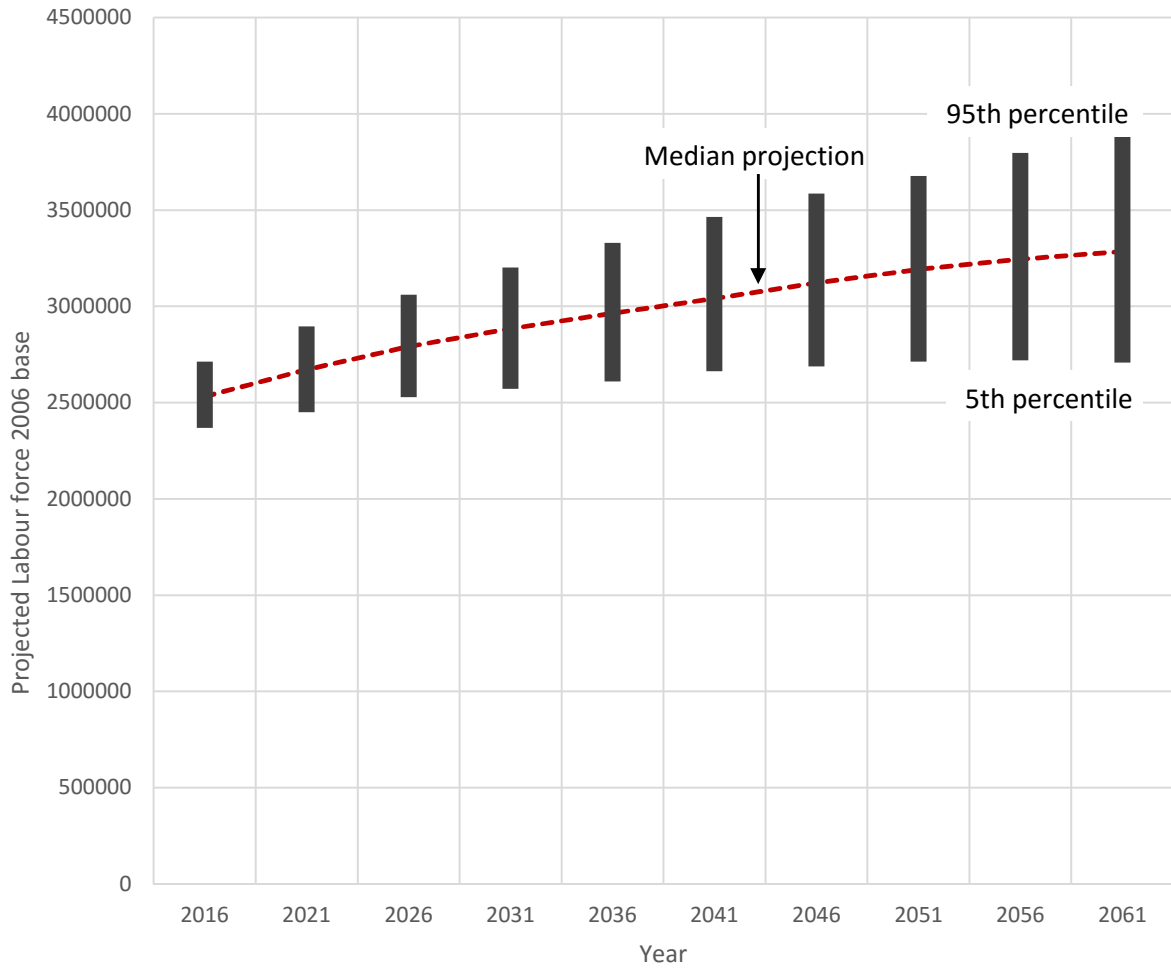
International visits

Figure 1 Distribution of Nzdep2013 Scores, with Nzdep2013 Decile Scale Superimposed.



Source: Salmond et al, 2013, pg. 28

Figure 2 National Projected Labour Force Characteristics, 2006(Base)-2061 (August 2012 Update)



Source: http://www.stats.govt.nz/tools_and_services/nzdotstat/tables-by-subject/population-projections-tables.aspx#NLFP

Table 1 Census Usually Resident Population (%) by Territorial Authority and NZDep2013 Decile

Territorial Authority	NZDep2013 Decile											Total
	1	2	3	4	5	6	7	8	9	10	NA	
Hamilton	7.3	9.3	6.7	7.0	8.7	9.7	12.8	12.3	13.5	12.4	0.3	100.0
Hauraki	0.0	0.9	1.9	3.7	9.5	14.3	12.9	17.0	21.9	18.0	0.0	100.0
Matamata-Piako	1.0	5.1	6.8	14.6	13.7	19.5	10.1	17.0	5.6	6.6	0.0	100.0
Otorohanga	0.0	2.2	6.0	18.9	17.5	15.5	11.7	7.2	12.2	8.9	0.0	100.0
Rotorua	5.7	5.5	8.3	7.8	9.5	4.1	8.9	12.0	17.3	20.9	0.1	100.0
South Waikato	0.5	2.3	1.4	11.1	7.2	9.0	3.6	13.7	22.3	28.9	0.0	100.0
Taupo	5.2	5.5	9.3	14.0	13.0	5.8	11.5	9.6	13.8	12.3	0.2	100.0
Thames-Coromandel	0.0	1.7	6.5	7.3	10.0	14.9	17.6	22.5	12.3	6.6	0.5	100.0
Waikato	10.3	13.6	8.9	9.5	9.3	10.5	8.6	7.1	9.2	13.0	0.0	100.0
Waipa	9.6	18.9	12.6	11.6	8.9	10.4	11.0	7.2	6.4	3.3	0.0	100.0
Waitomo	0.0	1.8	0.0	6.6	12.2	11.5	9.7	19.2	24.6	14.4	0.0	100.0
Waikato Region	5.8	8.4	7.4	9.2	9.8	10.1	11.0	12.0	13.1	13.0	0.2	100.0
New Zealand	10.2	10.4	10.2	9.9	9.9	9.8	9.8	9.8	9.9	9.8	0.3	100.0

Source: <http://www.otago.ac.nz/wellington/otago070691.txt>