Information Communications and Technology

Economic Impact Analysis

Revision History

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Introduction

State-of-the-art infrastructure, such as excellent schools and good roads, attracts both individuals and businesses to a region. In today's world this also includes high-speed access to state-of-the art information and communication technology (ICT). With more and more activities taking place online (including commercial, educational, and compliance functions) access to ICT can level the playing field between rural and non-rural communities when it comes to economic development. Unfortunately, King Island lags behind the nation when it comes to access to these important utilities.

Notes

This is a note. Notes like this one in this report indicate what people on the ground told us about the impact of poor ICT provision on

Similarly, individuals and families who live in rural areas benefit by having access to state-of-the-art ICT. This analysis briefly discusses how King Island is behind nationally in terms of access, why high-speed access to ICT is crucial to economic development, and what policy actions can help King Island conquer the "digital divide" that exists between rural and non-rural communities in terms of broadband access.

Broadband

Reliable access to high-speed broadband is the key to unlocking the potential of other ICT channels.

Broadband is efficient because it offers high-speed access to a fast-growing range of services (including commercial; government; and electronic-utility services such as online-search and open access educational resources). Broadband is now the preferred choice among Australian businesses accessing the internet, allowing adoption of best-practice tools such as cloud storage and video calling. Because they need only exist in a virtual marketplace, rural businesses can rely more than their city-based counterparts on broadband, to remain competitive in a global economy.

While most households on King Island have access to the internet and fixed telephone for voice calls, in most cases rurally, achieved internet speeds are either little or no better

than dialup, and mobile phones (where they can connect at all) cannot be used while driving, due to the many black spots in the centre of the island.

Providers of ICT Services

ISPs

Telstra

There is currently only one ISP on King Island – Telstra.

In the past, the King Island Regional Development Organisation has provided dial-up internet services.

Mobile Phone Networks

Telstra

There is only one mobile phone network on King Island – Telstra.

Retail products (over the Telstra network) are offered by Telstra, iiNet, Dodo, Internode, and Skymesh.

Optus

Optus does not currently operate on King Island.

Optus Licenses and Sites

Optus holds licenses for some broadcast sites on King Island, including a site off Grassy Road in Currie.

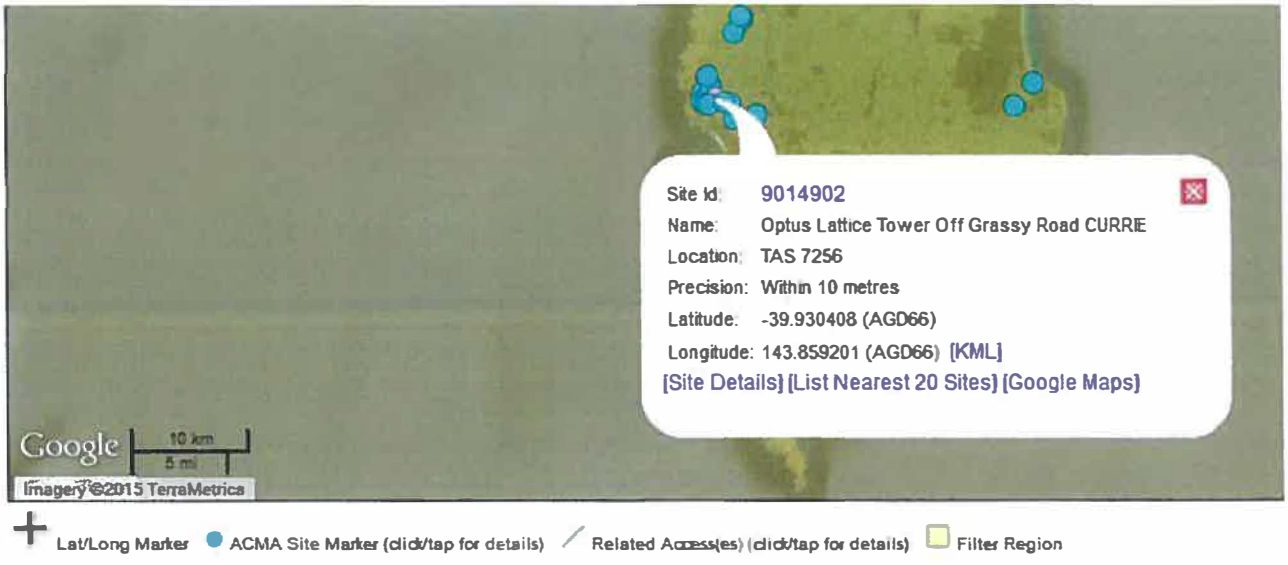


Figure 1 - King Island Council Facility

Optus – Transmission Co-Location

It may be possible for Optus or other networks to share Telstra towers for transmission ("co-location"). See: http://www.telstrawholesale.com.au/products/facilities/tower-site-sharing/index.htm for details of the process and application steps.

Optus – Coverage

Optus were sued by Telstra, and lost in 2014, for misleading coverage claims[3].

It could be to Optus's advantage to extend coverage in areas such as King Island, to boost the credibility of their coverage claims – additionally, this territory would offer a relatively good coverage return on required investment, if the towers can be shared.

Radio

Currently, the King Island Council-maintained facility on Tower Hill near Currie rebroadcasts some national radio stations.

A council facility also broadcasts a community radio station, which can be received in the Currie area where there is line of sight from the transmitter.

Figure 2 - King Island Council Facility

The costs associated with re-broadcasting radio stations are borne by King Island ratepayers. This includes both upkeep of the facility and associated hardware, and capital equipment costs.

Risks

The Tower Hill facility presents a single point of failure for radio signals across King Island. A total outage could result from any of:

- Interruption to inbound signal
- Power outage

- Hardware failure
- Software failure
- Severe weather event (e.g. fog and wave action interfering with the microwave connection between King Island and Tasmania)
- Commercial environment changes (e.g. if the commercial broadcasters' relationship with the council is exposed to legal or liability risks)

Television

Currently, the King Island Council-maintained facility on Tower Hill near Currie rebroadcasts some national television stations (in addition to commercial broadcasts from Gentle Annie which serve the South of the island).

The costs associated with re-broadcasting television stations from Tower Hill are borne by King Island ratepayers. This includes both upkeep of the facility and associated hardware, and capital equipment costs.

The Tower Hill facility presents a single point of failure for television signals across King Island. A total outage could result from any of:

- Interruption to inbound signal
- Power outage
- Hardware failure
- Software failure
- Severe weather event (e.g. fog and wave action interfering with the microwave connection between King Island and Tasmania)
- Commercial environment changes (e.g. if the commercial broadcasters' relationship with the council is exposed to legal or liability risks)

Other Facilities and Services

Other facilities and services fall mainly outside the scope of this analysis, but should be noted for completeness. These include:

- Dedicated connectivity for the health facility, emergency services (including police), and TasPorts, using dedicated backhaul bandwidth supplied by TasNetworks.
- Separate communications equipment at the airport (in addition to the planned WiFi and the airport fibre connection discussed later)
- The Ericsson-owned communications tower at Counsel Hill

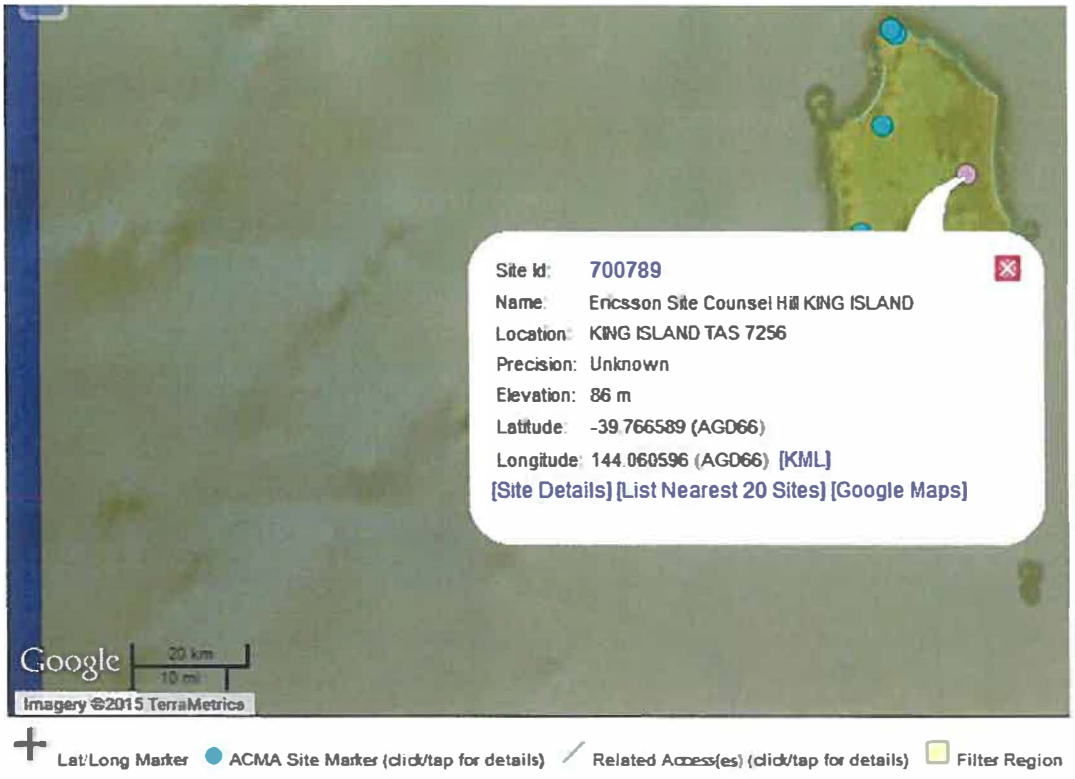


Figure 3 – Location of Ericsson Tower at Counsel Hill

Voice and Data Quality over 3G

A survey of 3G signal was performed across most roads and settlements on King Island for this analysis. All measurements were taken June 2 – June 5, 2015.

Network Topography

The network diagram below is an illustration of King Island's 3G, fibre and Copper network.

Note: Single sector panels exemplify existing infrastructure which could easily provide more coverage than is currently the case.

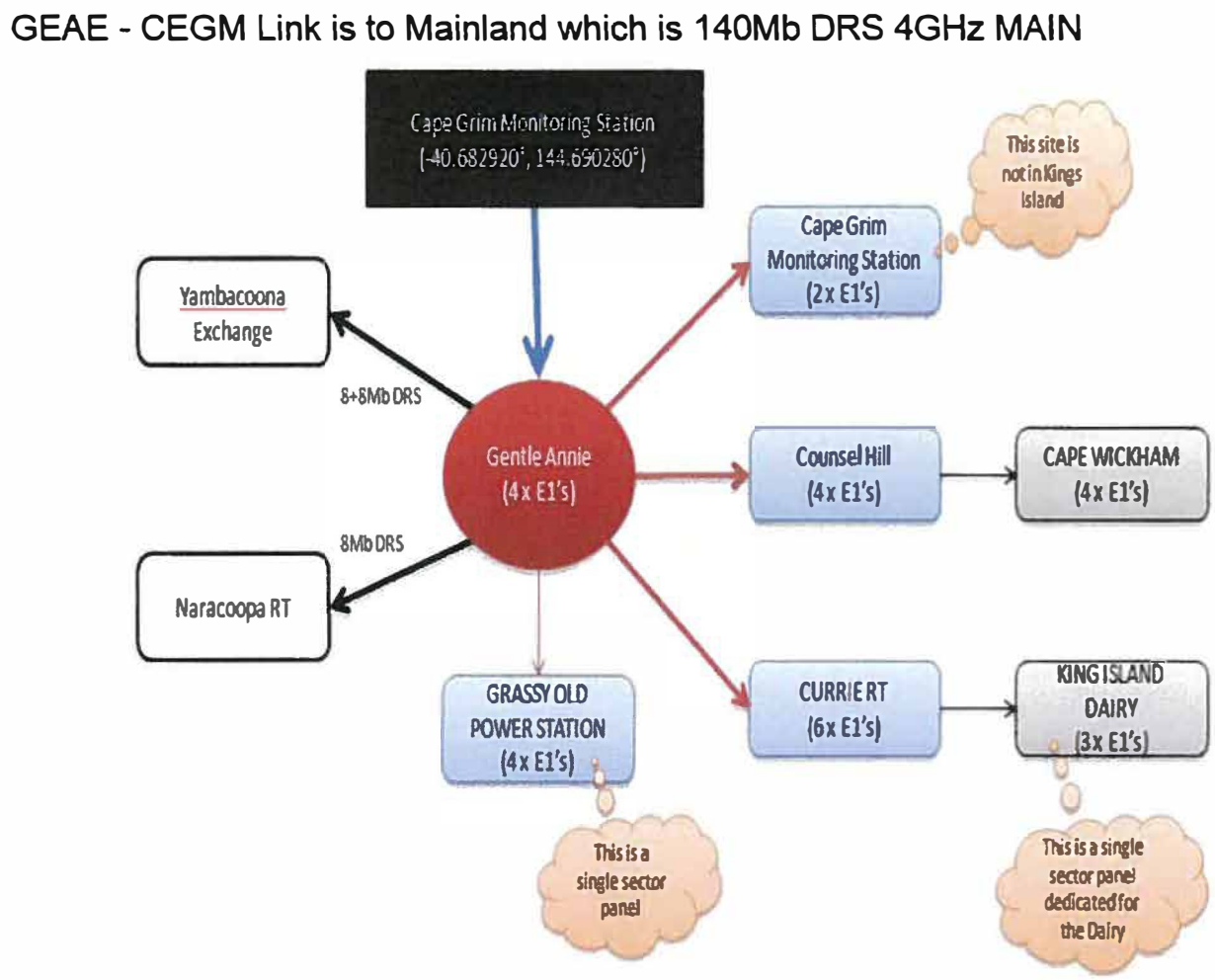


Figure 4 - King Island 3G and Copper Network Topography
Note: *This network map is based on the available information (as at June 2015), and may not be correct in every detail, or fully complete.*

Routes Driven

Signal measurements were taken on June 2 – June 5, 2015, using 1 Smart SIM configured with a 3G MultiRAT and Data connection, with the following objectives for 3G:

- Compare Call Setup Time
- Compare Accessibility
- Compare Connection Retainability
- Compare Handover Success Rate
- Compare Received Quality
- Compare Received Signal Strength

The diagram below indicates the routes driven in order to gather the signal data:

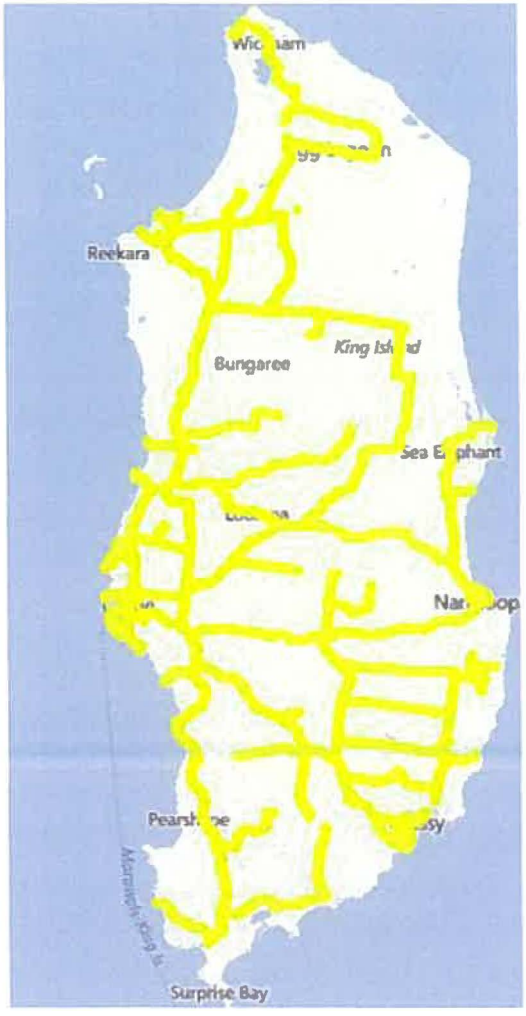


Figure 5 - Routes for Signal Measurement

Signal Strength

The Signal strength (dBm) was recorded as indicated below:

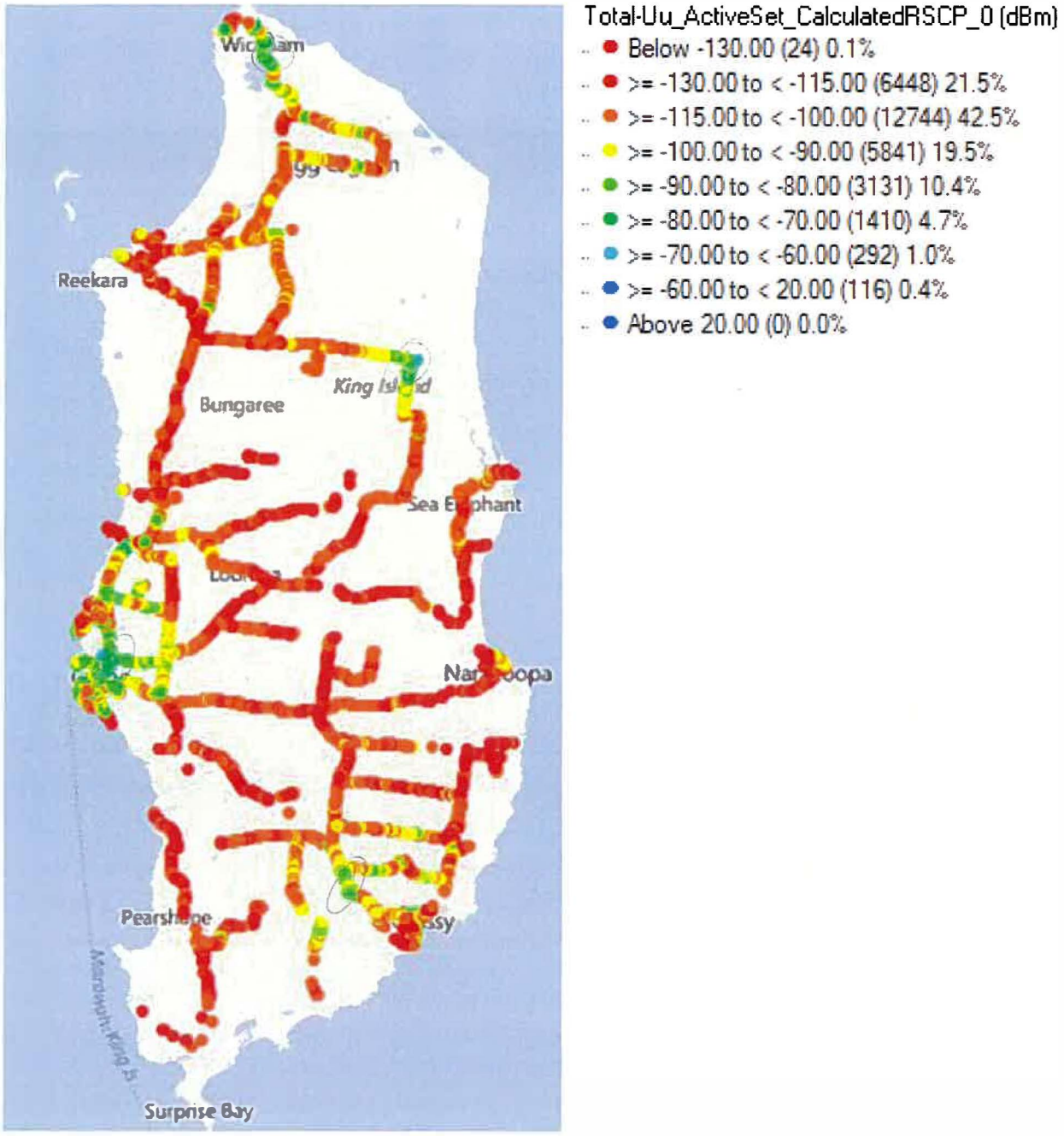


Figure 6 – 3G Signal Strength on King Island, by location

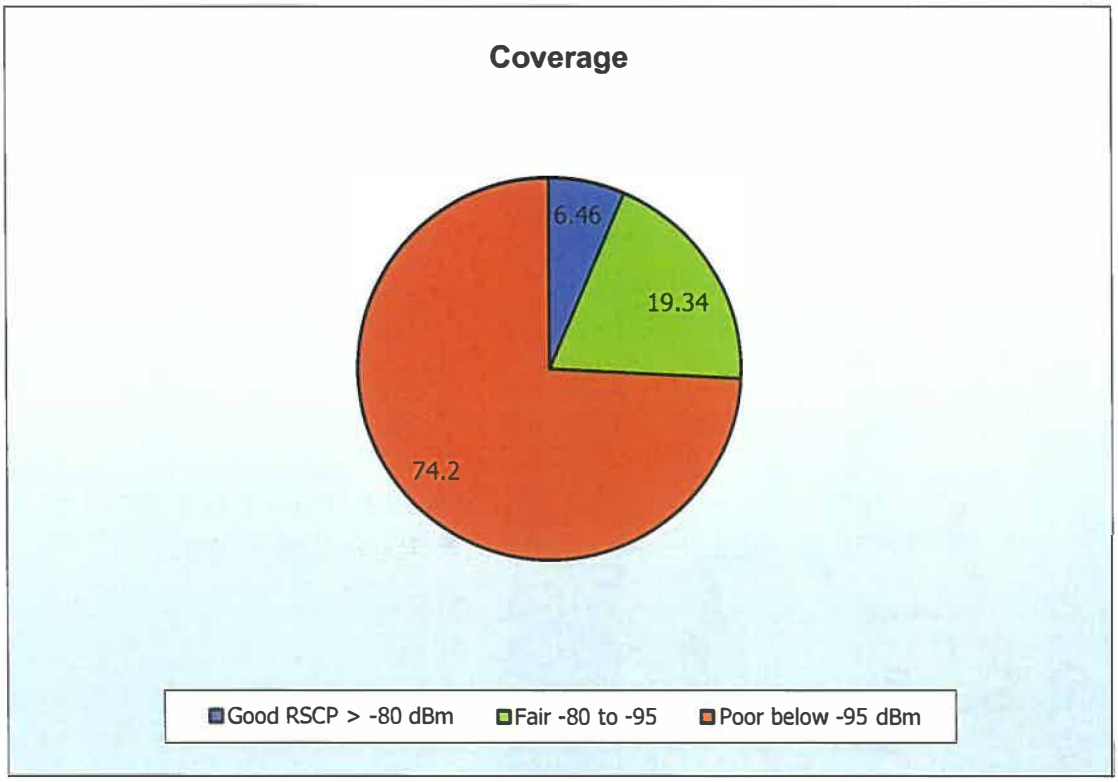


Figure 7 – 3G Signal Strength on King Island, by percentage

Signal Quality

The Signal quality (dB) was recorded as indicated below:

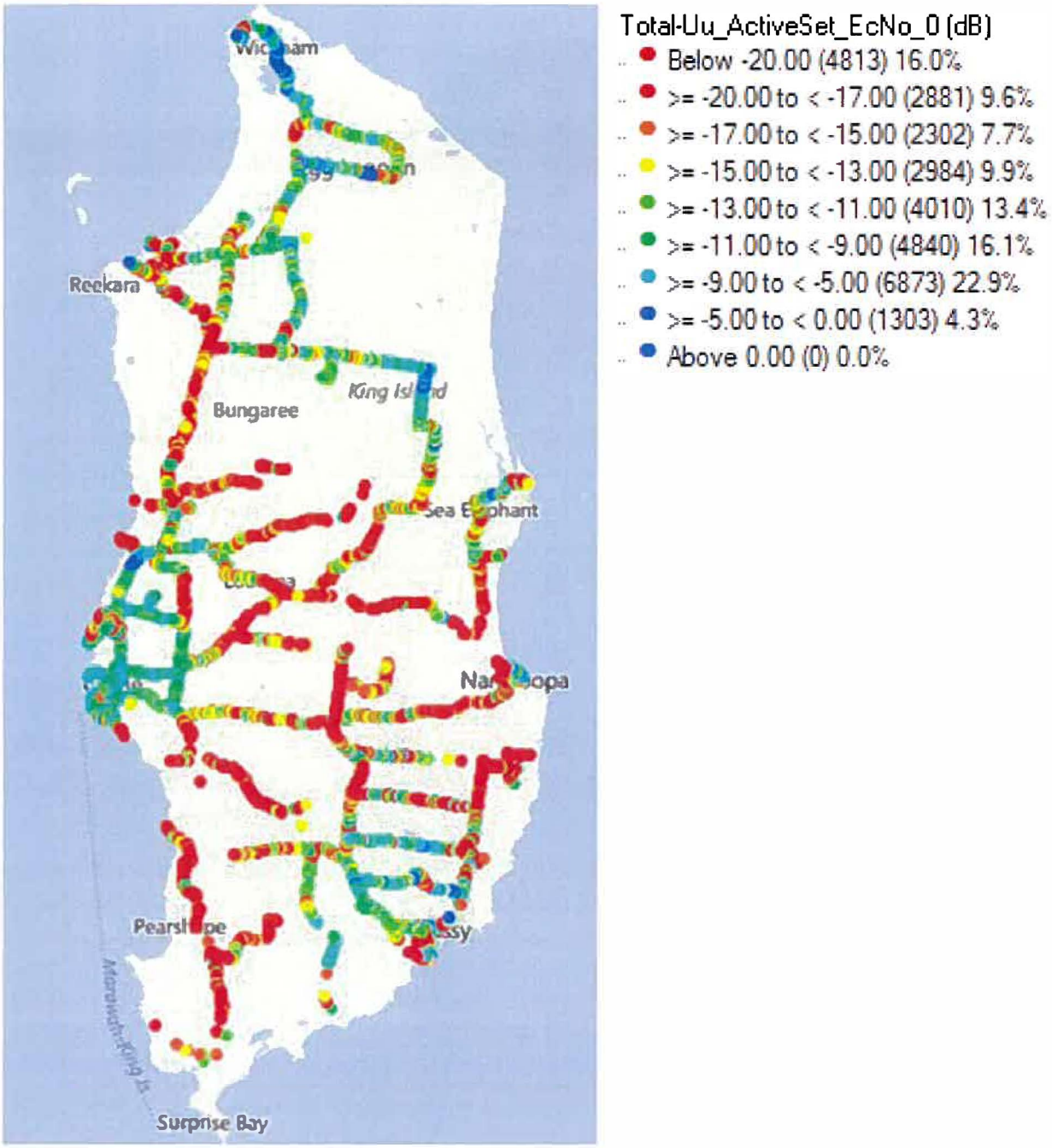


Figure 8 - Signal Strength on King Island, by Location

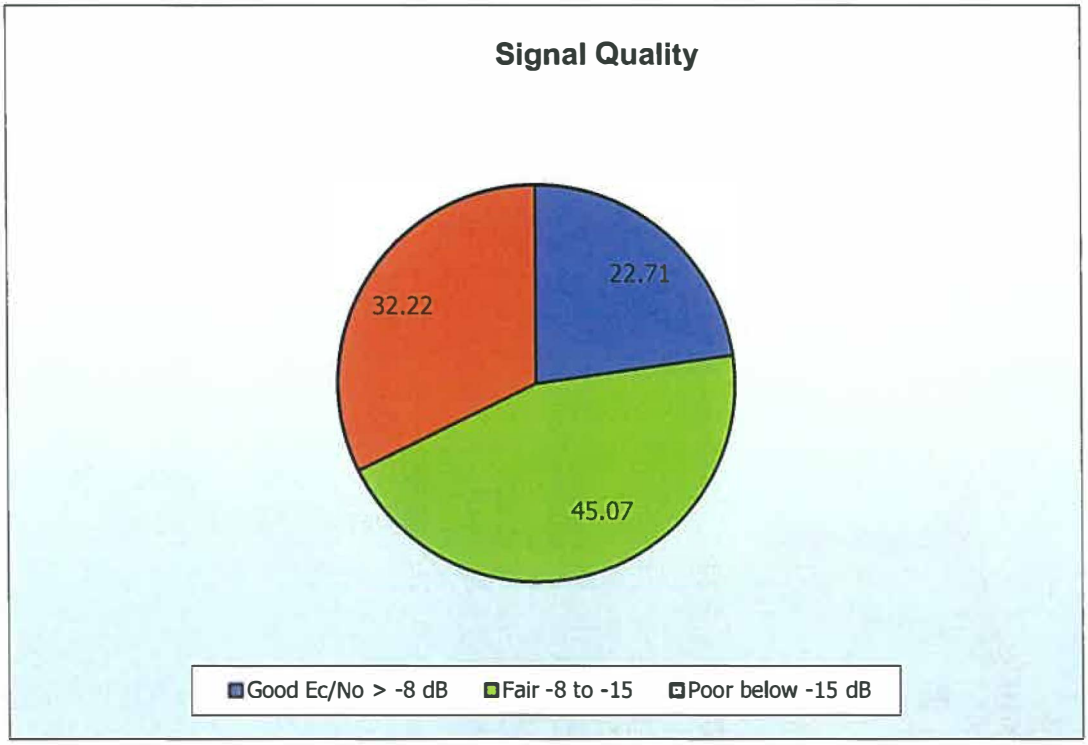


Figure 9 - Signal Quality on King Island, by Percentage

Downlink Throughput

Data throughput down to the device (i.e. download speed) was measured as follows:

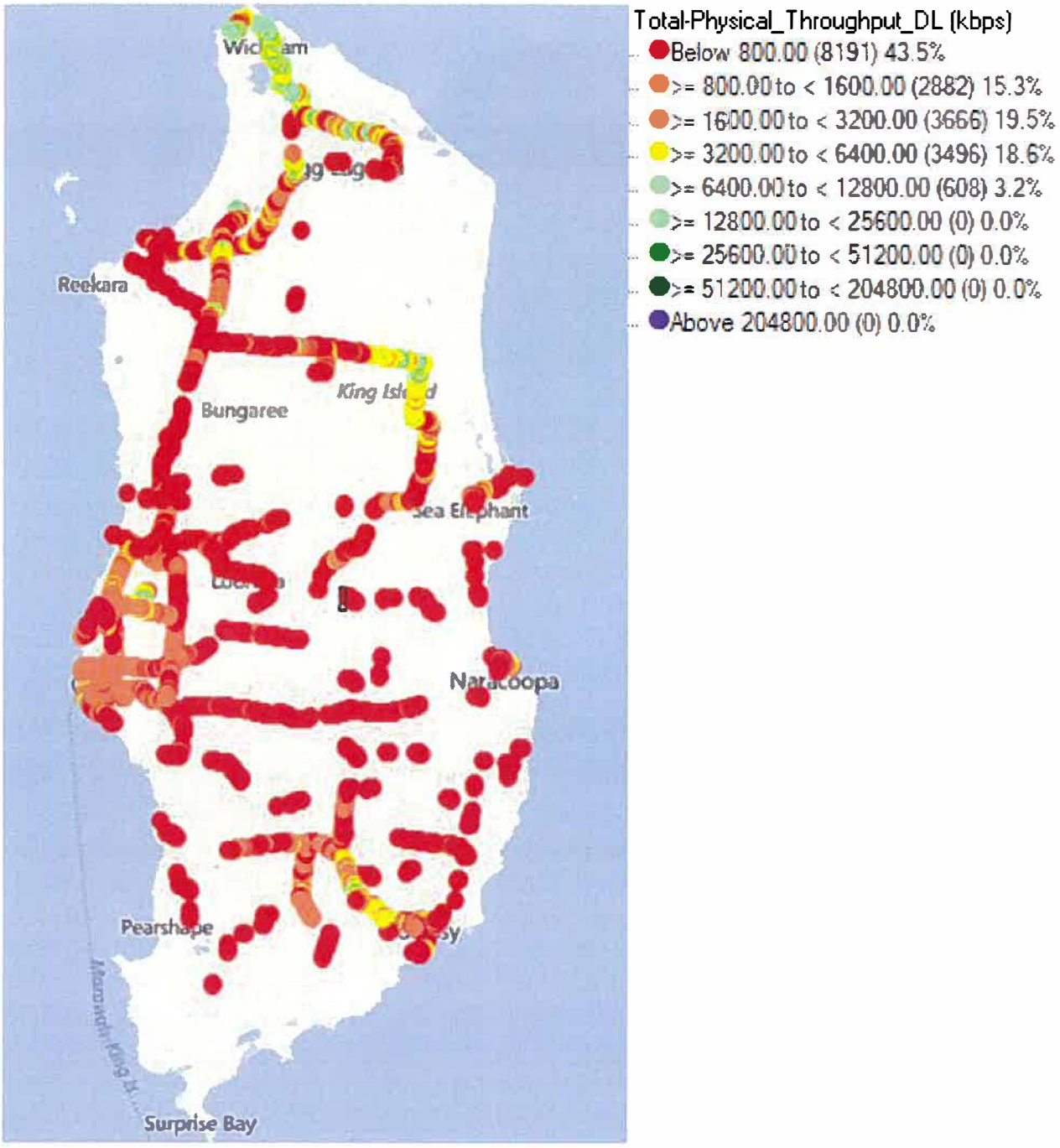


Figure 10 –Download Throughput on King Island

Uplink Throughput

Data throughput up from the device (i.e. upload speed) was measured as follows:

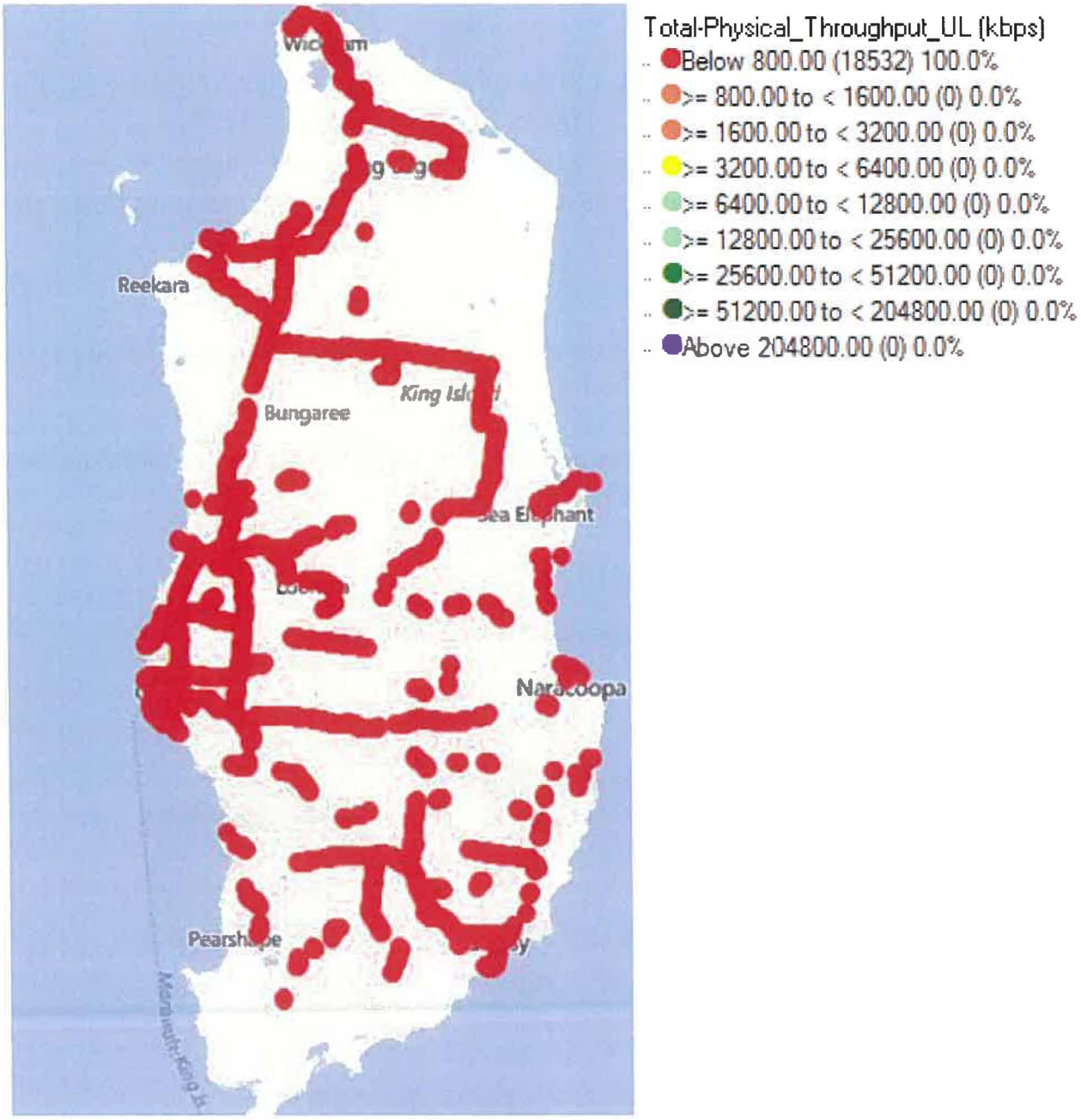


Figure 11 –Upload Throughput on King Island

Pass/Fail Metrics

Based on the measurements indicated in the preceding graphics, and the (industry best practice) targets (indicated in the **Target** column) pass/fail ratios were calculated as shown below:

Domains

Services with real-time constraints, such as voice and video-telephony (e.g. Skype) are provided by the **CS Domain**, whereas **the PS Domain** provides packet data services characterised by periods of alternating high and low traffic loads ("bursty" traffic). Examples of services offered in the PS domain are streaming, web browsing, email, and SMS/MMS.[4]

Ec/Io and RCSP

Ec/Io indicates the ratio of signal to noise (interference). This is a measure of signal quality (not strength).

RSCP is the received signal code power (Ec/Io + Received Signal Strength). This indicates the usability of the signal (strength plus quality).

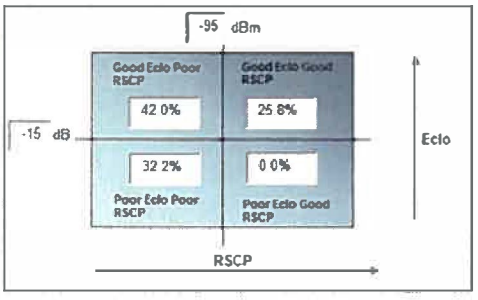
By most measures, the signal on King island fails benchmark tests.

CS Domain

Metric	Target	Pass/Fail	Value
Overall Call Success Rate (End to End)	95%	Fail	45.8%
Dropped Rate	2.5%	Fail	51.6%
Call Setup Duration (secs)	8	Pass	4.5

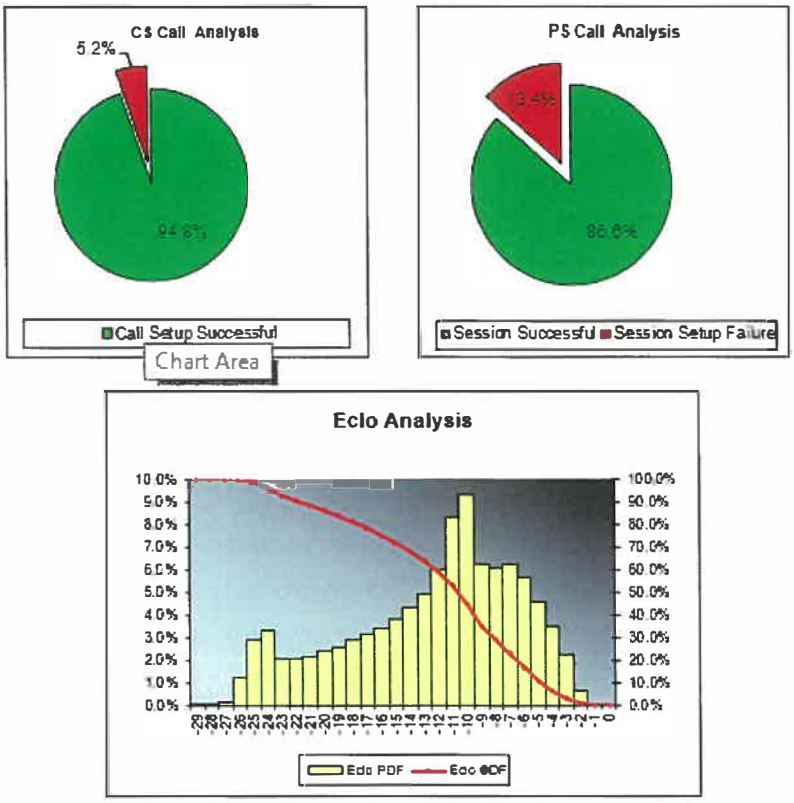
PS Domain

Metric	Target	Pass/Fail	Value
Overall Call Success Rate (End to End)	95%	Fail	55.6%
Dropped Rate	2.5%	Fail	35.8%



Metric	Target	Pass/Fail	Value
Good Ec/Io - Good RSCP	90%	Fail	25.8%
95% Percentile of Ec/Io	-15	Fail	-23.5
95% Percentile of RSCP	-95	Fail	-117
Single Server percentage	80%	Pass	86.3%
Pilot Pollution (Location)	5%	Pass	2.9%

File overview	
Number of files loaded	89
Combined file size (MB)	331.0



How Organisations Are Using ICT - Challenges

ICT is already at the heart of how many organisations on King Island conduct their business. The reports below from participants in this analysis show day-to-day ways of working which would be impossible without access to ICT, and the challenges currently faced due to "tyranny of distance" issues including hardware provision, connection speed, bandwidth caps, lack of wired connections, lack of ports and DSLAMs, lack of technicians, signal dropouts, and many other factors as detailed below.

For this analysis, representatives from each of the organisations listed below indicated to us some of the major impacts of poor ICT provision for the operation of their business.

Ballarat and Clarendon College

Ballarat and Clarendon College, a combined elementary and high school based in Ballarat Victoria, maintains a campus at Grassy where all year 9 students spend one whole term, including prolonged hiking trips as part of their broader education.

Issues faced due to poor ICT availability at Ballarat and Clarendon College Grassy campus include:

- When the server goes down at Grassy, support is available only in Ballarat (and often therefore cannot be reached due to telephony issues)
- Major issues with connection speed. This is estimated to cost staff on campus between 1 and 3 man-hours per working day.
- When hiking trips are arranged, safety concerns are much greater than they would be if those accompanying the children had reliable mobile coverage, and this has costs including requirements for extra staff.
- For health and safety reasons, the campus considered investing in satellite phones for leaders on hiking trips. The cost of these is prohibitive however, so instead hiking groups are provisioned with GPS spot checkers. This is not ideal as it means the group still cannot make contact in cases of emergency, nor can they be contacted, for example:
    - To be warned of extreme weather events.
    - To make real-time changes to outward bound courses (e.g. to respond to vehicle breakdowns or staff being sick)
- Significant, frequent disruption to the working day is routine due to dropped emails (the mail client shows emails and associated attachments as “sent”, then following day they appear in "outbox".
- The Grassy campus recently spent over $1,400 on 2 days of time (internal staff flown from Victoria) checking the systems and analysing the reasons for the slow speeds achieved, and the outcome was that given the current limitations around backhaul bandwidth, the situation cannot be improved.
- Ballarat and Clarendon College’s management meetings are conducted as group calls. Being able to use Skype or a similar video-calling software package, in addition to the standard benefits of showing facial expression and body language in meetings, would:
    - Cost significantly less in ongoing costs
    - be more convenient and offer better audio quality compared to King Island’s copper line call quality through the Grassy exchange
    - allow sharing of images (e.. photos of infrastructure/vehicle damage, medical issues, with the group)
- Grassy campus staff must act in a "field medic" capacity when there is a medical emergency. This has included several emergency interventions, including being talked through medical procedures over the phone. Lack of video facilities plus poor voice-call connection and frequent drop-outs pose obvious health and safety concerns in this scenario.

Farming

Farming is an important industry on King Island, with most farms operating as independent small businesses.

Operating a farm involves considerable time spent away from the home, both on foot and in a vehicle. As such, mobile reception "on the road" (i.e. ability to use the phone via a hands-free solution, while driving) is not only poor, but is reported by many to have degraded significantly since 2013.

In addition, running a farm as an independent small business is becoming ever more difficult due to an increasing assumption of access to portals such as the ATO and ASIC websites. King Island rural residents' eligibility for satellite broadband (which would at least offer a partial workaround to this issue) is impacted by future plans for NBN rollout over 3G – but as this rollout has no definite date (as of June 2015) this leaves many farmers in a difficult situation for the foreseeable future.

FoodWorks, Currie

There are several food retailers on King Island. FoodWorks is one of the largest, and faces typical challenges, including:

- The slow internet speeds achieved require a management resource to spend an additional 2 man-hours performing accounting/book-keeping tasks every working day.
- Use of MYOB requires local files, so time and effort is spent creating local backups and removing them regularly from site for offsite backups
- Some use of 3G data is unavoidable given the constraints on other connectivity options. The estimated difference in cost for this data, compared to similar 3G packs purchased in state capitals, is approximately 400%.
- Most staff lack broadband access at home, and never had broadband access at school, so are unfamiliar with basic online tasks. This increases training requirements and staff ability to tackle certain tasks.

Hardware Failure

No stock of Telstra-compatible routers is carried on King Island. As a result, if a modem develops a fault, businesses must currently wait (with no internet connection) while a modem is posted from the mainland.

- Most FoodWorks outlets stream the group's current in-store playlist, including realtime promotions, over the internet. Instead, the King Island branch must send a staff member to collect a disk from the post office, and then load the disk to the in-store PA and manually read out daily specials.
- Not all promotions are successfully managed in this way, resulting in King Island consumers paying more than mainland shoppers for the same FoodWorks goods.

King Island residents who live remotely may only budget for a single trip to Currie. If they attempt to call in their order but cannot due to poor mobile coverage, this results in both lost business for FoodWorks, and impacts for consumers who may not have the time to collect goods in-store if the phoned-in order wasn't successful.

Hydro Tasmania

Hydro Tasmania operates the Currie integrated power station (diesel/solar) and also the Huxley Hill wind farm. As such, the operation must deal with the twin challenges of a remote site on King Island (Huxley Hill has almost no mobile coverage in many areas – even the best blue tick mobile phones fail to connect) and also the requirement for connectivity with headquarters and other offices on the mainland.

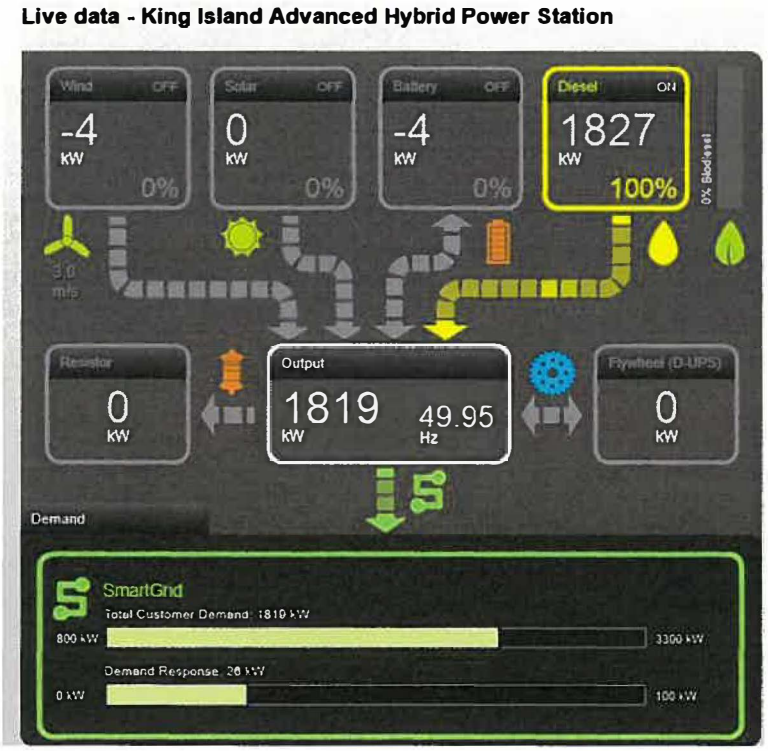


Figure 12 - Hydro Tasmania Online Real-Time Smart Grid Status Page

Hydro Tasmania have taken many measures in recent years to minimise the impact of poor ICT provision on the island, but there are still many significant impacts.

These impacts include:

- Extra man hours performing tasks from home (which is occasionally required) personal connections at home are mostly extremely slow (as little bandwidth as 256kbps in some cases).
- Mobile coverage is a huge issue due to movement between the sites and the requirement to monitor remote infrastructure – Hydro Tasmania made a significant investment in satellite phones recently, to cover off total blackouts and when driving through blackspots.
- Some offices/locations are still connected with a speed of around 700kbps. This makes transferring data to/from these sites extremely time-consuming
- Hydro Tasmania cannot use the 3G network due to security requirements, which means landlines are used for data – this is much slower and places the organisation at a particular disadvantage.
- The construction of an additional turbine at the Huxley Hill site will incur significant extra costs as, for safety reasons, a private comms system will be installed in the new turbine paddock, which has no 3G signal at all.
- Hydro Tasmania use MS Lync company-wide, but on King Island it can be used only for voice.
- In town (at the depot) speed is acceptable – the intention is to invest in fibre where required so that other sites can benefit from similar speeds as the depot in Currie currently does, but digging a trench and laying fibre is a significant investment.
  Note: Fibre optic hung from power poles has been proposed as a possible cost/speed compromise solution. This could be a good value proposition within Currie (and possibly Grassy when the mine reopens), but wireless is more appropriate to connect the rest of King Island to the exchanges.

King Island Airport

The airport has ADSL (this was installed by Airlines of Tasmania within the last 3 years) and therefore good internet speeds are sometimes achieved from the terminal.

Mobile Congestion

Passengers make good use of the airport's Telstra 3G coverage, but there were multiple reports of mobile congestion when the airport was busy with both arrivals and departures, resulting in devices showing full signal (5 bars) but returning a "cannot place call" error when trying to connect an outbound call.

King Island Council

Broadband

Council has an ADSL2 subscription with Telstra. However, there are daily dropouts and the slow speeds mean that many tasks are either time consuming or impossible online.

Rebroadcasting

The council currently pay for upkeep and maintenance of the Tower Hill facility above Currie, which rebroadcasts both TV and radio signals.

Costs include:

- $7,500 - 8,000 per annum for digital TV provision
- $1,000 per annum for radio provision
- Depreciation on an investment of $18,500

This effort and expense is required because the commercial networks have not expressed interest in broadcasting to the island.

Videoconferencing

Videoconferencing is currently impractical as council chambers lack the required hardware.

When videoconferencing is essential, both the King Island and remote parties remove themselves to the local hospital, and the conference is performed using the Health Centre's TasNetworks link to Tasmania. This is obviously disruptive and impractical, and further impacts provision at the Health Centre.

Council have been offered video link facilities at no cost (due to upgrades to existing facilities on the mainland). In particular this would allow many regular Cradle Coast Authority meetings to be attended "virtually" rather than (as now) purchasing return flights for staff, with the attendant financial, time, carbon-footprint, and weather-related issues.

However, King Island Council cannot take advantage of this offer of free hardware, without access an affordable data plan capable of supporting high definition streaming video (up and down simultaneously). No such plan is currently available.

Disaster Recovery

Adoption of cloud services would be very valuable for disaster recovery purposes, but is impractical with current connection speeds.

Internal Comms

Council currently use a privately maintained microwave link to communicate between the depot and Currie and other locations. In addition to the financial/maintenance overhead, the link frequently drops when most needed (i.e. in severe weather).

King Island Dairy

The Lion Drinks & Dairy-owned King Island Dairy has a dedicated fibre connection to Currie, and dedicated bandwidth. Broadband connectivity is therefore better than for most other businesses on King Island.

In addition, the dairy enjoys a directional panel providing mobile phone coverage at the factory site and along the approach road to the factory. Mobile phone coverage is however still an issue when staff are offsite.
Note: Upgrading this panel to provide 360 degree coverage, and possibly moving the transmission tower to the top of the hill, should be discussed with Telstra as relatively small investment would be required to leverage existing infrastructure to provide coverage across a wide area which is currently a black spot.

Productivity is impacted due to staff not being able to call when sick – most often they simply do not arrive for work, and only then can management begin the process of looking for a replacement resource.

Inland Mobile Reception

There are over 30 family businesses (mostly farming) around Cape Wickham alone. None can rely on being able to call home once they start driving.

Installing signal boosters in the home can improve this situation, but the upfront cost (including installation and configuration) is high, and outdoor aerials have a relatively short service life, an require ongoing maintenance and repair due to the island's maritime climate

The dairy is a major employer on King Island, employing up to 120 people at the seasonal peak. Training is therefore crucial – and training takes place at Huxley Hill, where mobile coverage is unavailable. Due to this constraint, currently when training is arranged, trainers:

- Provision every trainee device with a local copy of all training materials before departure for Huxley Hill (this is time-consuming and prone to error)
- Print out hard-copies of resources as they cannot be shared over 3G (this is expensive and environmentally destructive)
- Brief trainees and the responsible contacts at the dairy farm on safety precautions necessary due to being both remote and uncontactable

King Island District High School

The high school shares two ADSL2 connections for the entire institution (staff and students).

Teachers cannot stream video for class demonstrations without tethering devices to their mobile phone 3G connection at their own expense.

A dedicated microwave link for the school was discussed, but $40,000 per year was quoted by Telstra, and the plan was abandoned.

Satellite Broadband

In one case, a rural Telstra subscriber applied for a Satellite broadband connection, and the install was scheduled. Before travelling to King Island to perform the install, the installer appealed the eligibility, on the grounds of future 3G broadband provision by NBN Co in the area, and won their appeal so the install was cancelled. When the subscriber asked Telstra for a date by which NBN connectivity over 3G would be available, they were told there was not yet a definite date for rural King Island.

King Island District Hospital

King Island District Hospital is impacted by poor ICT provision as follows:

- The internet is very slow, unusable for many required functions
- The hospital has invested in a Satellite phone for emergencies due to the unreliability of the other telephony options
- All files are digitalised according to current best practice – this leads to issues both for saving files and accessing past records (which can be extremely slow).
- Videoconferencing (which uses dedicated backhaul provided by TasNetworks) is currently being used and is acceptable, but there are doubts that the dedicated line will be sufficient as the videoconferencing facility will be used more and more heavily in the near future.

King Island Pharmacy

In January 2015 a fire in Currie burned down two buildings housing businesses including King Island's only dispensing pharmacy[1].

Lack of standard (cloud-based) offsite backup meant that many records were unnecessarily lost, including many King Island residents' prescription histories, with obvious health implications.

King Island Scheelite

The King Island Scheelite Dolphin Project is focussed on redeveloping the original scheelite (WO_3) mine on King Island. The first stage of the plan involves reopening the former underground mine at Dolphin and constructing a processing facility to produce 3,500 tonnes of WO_3 concentrate per annum. Once the first stage is operational, there is the option of reopening the nearby Bold Head mine and incorporating additional down-plunge tonnes at Dolphin to increase output and improve returns.

The mine site is located at the foot of the steep cliff below Grassy, without line of sight to the existing mobile mast across most of the site.

Impacts to the project due to poor broadband and mobile reception include:

- The requirement to perform significant administration work in Sydney – this is very challenging given the extremely slow internet speeds achieved.
- Poor-to-no mobile reception at and around the site
- Best practice currently for similar operations involves significant use of equipment monitored remotely by mobile technology – but this requires a

solid, reliable 3G signal. If this cannot be achieved, more cumbersome solutions will need to be adopted, which include additional overheads and the requirement to employ more people, reducing competitiveness.

King Island Sea Salt

King Island Sea Salt is a family business operated from the township of Grassy, to the south of the island, some distance from the Currie exchange.

King Island Sea Salt produce low-volume, high added-value products including hand-harvested sea salt, native pepper-berry, and roasted spices.

King Island Sea Salt's clients include parliament house in Canberra (ACT), and marketing their products to remote and urban clients relies on a functional web presence and the ability to take orders online.

Poor internet connectivity in Grassy impacts King Island Sea Salt's business in many ways. A particular frustration is that connectivity is normally so poor that that simple text-based chat applications (e.g. Facebook chat) disconnect and fail part-way through client orders, resulting in lost business and client frustration.

Competing Online

An accounting business with many remote clients told us their response to the escalating [ICT] issues has been to "terminate employees and wind the business down".

King Island Tours

King Island Tours is a family-run company offering guided tours of King Island, aimed at the premium sector of the market.

The premium tourism sector attracts many clients who run their own business, and therefore have a requirement (and expectation) to remain "always on" in today's connected world. King Island tours has a high proportion of business owners and senior managers on their tours. These people are often influencers and/or decision makers for a significant corporate accounts with ISPs. For this reason, disappointment with service levels and connectivity on their tour may have impacts beyond decisions about their personal phone and internet reflect

King Island Tours have been impacted in many ways by poor ICT services, including Health and Safety impacts and business impacts:

- Clients book, but cancel upon learning that there is not reliable mobile coverage for the tour.
- Clients book, but then "sit out" the tour and instead send their family, so they could remain at their accommodation, and continue to transact business.
- During medical emergencies, Tours staff have had to:
    - Trek to the top of a hill to get mobile coverage
    - Climb onto the roof of the tour bus to make a call

Remote Clerical and Office Workers

Many traditionally office-based roles are increasingly performed by remote workers throughout Australia since the widespread availability of internet connectivity in the 1990s. In addition, the productivity of remote workers is significantly higher[2].

These traditionally office-based roles include book-keeping, accounting, software roles, and telephone support. These forms of employment can act as a significant boost to rural economies.
On King Island, the generally poor speeds and reliability of broadband connections, combined with an ever-increasing requirement to perform work “in the cloud”, or (especially in the case of accounting and related roles) using approved government portals such as the ATO and ASIC websites, means that such work has become increasingly unviable over the last decade. These “heavy” security-enabled websites:

- Take a long time to load over slow connections (which costs efficiency, and reduces the ability to deliver urgent work to clients on time)
- Often time out before they can load (sometimes leading to a situation of a user becoming permanently “locked out”)
- Are least usable when most required – towards the end of office hours during the working week (due to contention for backhaul bandwidth from King Island to the mainland).

Inland Mobile Receptio

There are over 30 family businesses (mostly farming) around Cape Wickham alone. None of them can rely on being able to call home from their vehicles.

Remote work which involves travelling to client’s homes or businesses in order to work using a connected device (laptop or tablet) is often impractical due to lack of signal.

Contact with King Island clients is doubly compromised for remote workers – there are usually connectivity issues at both ends of the call. This makes it difficult or impossible to compete with businesses on the mainland with reliable fixed-line connectivity.

The costs of installing signal boosting aerials (external) and signal projection devices (internal) in order to obtain minimal signal strength is another cost which mainland competitors don't have to bear.

Finally, with no carrier competition on King Island (because all telephony and ISP retailers use Telstra's network) there is no opportunity to access the better value data plans available in the state capitals and elsewhere in rural Australia.

TasPorts

TasPorts operate the port facilities at Grassy through which most non-airfreight goods (including premium perishable food goods, which are both high-value and highly sensitive to transport time) are transported to and from King Island. As such the functioning of the port facility, and associate shipping capacity, are crucial to the King Island economy.

As a fully state-government-owned company, TasPorts is able to access (along with King Island hospital and the emergency services on the island) the separate backhaul bandwidth provided by TasNetworks. However, this only slightly ameliorates the issues faced due to the concurrent lack of reliable 3G connectivity and broadband.

TasPorts is impacted by poor ICT provision on King Island in the following ways:

- Ports have a managed Telstra 3G service (this includes some level of guaranteed bandwidth). The performance of this service was described as "poor to average" overall.
- Wired broadband was recently investigated – there are 12 copper lines to the port terminal, and Telstra suggested 2mbps up/down would be achievable by using all 12 lines for data only, at a cost of $20-30,000/year.
- Various upfront and ongoing costs incurred due to poor service, including:
    - A recently capital infrastructure project to improve signal around the port area – a large Yagi signal booster system has been installed along with other upgrades.
    - TasPorts recently invested in providing staff with more expensive "blue tick" mobile phones.
    - The current POTS solution is useless for internal conference calls – quiet, crackly, and often completely inaudible. For this reason, more

travel is booked (an estimated 12 return flights/year are booked, compared with a requirement for 4 return flights/year if videoconferencing worked well) and more face-to-face conferences are required with customers on the island also.
    - For King Island (the only site not able to join the TasPorts VOIP network) a PABX had to be purchased and configured – this was expensive, and involves ongoing maintenance and configuration costs every time the main VOIP network which the PABX connects to is upgraded.
    - A local solution is required for the management of the TasPorts computers on King Island, as their connection with the rest of the TasPorts network is too slow to allow them to be centrally managed like the rest of the TasPorts network
    - An extra layer of management is required on KI to manage operational and security matters which cannot be managed remotely as they can at all other sites
    - When they receive a call on their mobile, staff must often walk some distance to a spot where there is adequate signal. This impacts productivity for both the recipient of the call and the caller (often management).
- For a government organization such as TasPorts, there is an impact to their ability to meet carbon reduction targets, due to extra flights and extra driving due to poor signal and/or lack of videoconferencing facilities.
- Security, biosecurity and liability concerns are more challenging to address: TasPorts operates a regional security centre in Hobart which actively and efficiently manages their remote sites (except King Island). Technologies include Digital Video Recorders (DVRs) with live feeds. KI Port cannot be monitored in this way (there is insufficient bandwidth for the DVRs) which means once staff finish up for the day the facility is effectively unwatched except for the ability to check recordings the next morning. This means:
    - In theory it is a vulnerable entry point for entering King Island/Australia
    - Future regulatory changes could expose TasPorts to a requirement to staff the facility overnight, or otherwise impose overheads.

Tradespersons

Those working in the trades (for example electricians, cable technicians, plumbers) face similar challenges to remote clerical workers on King Island due to poor ICT provision.

Electricians and technicians are particularly disadvantaged, as an increasing proportion of the resources necessary to keep knowledge and qualifications up-to-date are most easily and cheaply available online.

Housing Growth and Immigration

Immigration to the island is, after tourism, the largest prospect for economic growth, and the knock-on effects for real-estate appreciation and infrastructure investment will benefit all residents, and allow the council to improve infrastructure and services accordingly.

The current poor state of ICT provision on the island acts as a brake on immigration due to the reduced desirability of the location (which otherwise has unlimited potential, as it combines some of Australia's cheapest coastal property prices with a half-hour flight time from Tullamarine). Issues for potential migrants to King Island include:

- Many television channels are not available on King Island
- Broadband is completely unavailable currently, unless near an exchange
- Even if close to an exchange, there may be no spare port to offer broadband to new residents (this has been true quite often in Currie in recent years)
- Mobile reception is generally poor, and may be either completely unavailable in their chosen location, or require expensive and hard to maintain systems of "booster" aerials to obtain a minimal signal
- There is no choice of provider for mobile, fixed-line or internet services
- Data rates are significantly more expensive than most other regions, and hugely more expensive than, for example, Melbourne.

Service Provision and Regulatory Requirements

Government portals (ATO, ASIC, and Centrelink among others) are increasingly reliant on internet contact. These government portals are generally "heavy" (require significant bandwidth to load effectively) due to the technologies and security measures implemented. In many cases, King Island residents connecting over 3G tethered solutions or over a wired connection that is distant from the nearest exchange, find that these sites time out or fail to validate a login, effectively meaning that business must be transacted by mail or telephone.

Sub Standard Service

In at least one case, Telstra had acknowledged sub-standard service was provided, and released a King Island customer from their contract but as Telstra are the only carrier on the island, this simply leaves the customer needing to sign up with a rival retailer delivering service over the Telstra network.

Existing Schemes & Role for a Co-ordinating Body

During the course of the assessment, several stakeholders independently suggested that major benefits could accrue from the creation of an island-wide co-ordinating body for ICT.

Various models exist for how a co-ordinating body could be auspiced – these include:

- By King Island Council (with or without assistance at state level)
- By the chamber of commerce (independently or collaboratively with King Island Council)
- As a public-private partnership (PPP)

PPP is possibly the preferred model.

Benefits

The chief benefits of a co-ordinating body would be to:

- identify opportunities for cost-savings and infrastructure sharing
- identify opportunities for extensions / additions to existing and planned infrastructure so that the benefits accrue to the wider community in addition to the private owners (in these cases there is often a benefit to the private owners as well, as there may be opportunities to share costs and/or improve the infrastructure)
- act as a "common voice" to amplify and aggregate issues and concerns stakeholders have about existing infrastructure and planned projects (for example, where many businesses are impacted by poor mobile provision, where their concerns are presented together, this may be more likely to incentivise spending to remedy the problem)
- act as an "honest broker" for individuals and business seeking technical assistance with ICT issues (for example identifying suppliers and equipment that has worked well in the past in a King Island context).

Education & Information

Although in the long term hardware and infrastructure effort will be required, an interim effort in education and information for consumers of ICT services is suggested as a low-cost, quick-results first step.

Education & Information Examples

Suggestions for education topics include:

- Choosing the correct hardware, including:
  - "blue tick" mobile phones
  - signal-boosting equipment
  - 3G signal repeaters ("cel-fi")
- Phone safety, including:
  - Having an unpowered analogue handset in the house so the POTS service is usable if the power fails
- Software Configuration, including:
  - Installation and use of mail clients so emails can be safely composed "offline" and sent when connectivity is available

Education Channels

The following channels were mentioned as offering a good potential for increasing awareness and knowledge in the above listed education and information areas:

- Press and local radio
- Leaflets provided by council / chamber of commerce and distributed in retail and service premises across the island
- Email releases using existing mailing lists

Equity - Levelling the Playing Field

A major concern of King Island Council is "levelling the playing field" not only between King Island residents and other Australians who generally enjoy access to far superior ICT provision, but also between residents of Currie (who currently enjoy reasonable 3G access, and acceptable broadband speeds for some parts of the day) and rural King Island residents, some of whom have literally no internet access at all.

With this priority in mind, Council must urge all stakeholders (whether State/Federal government bodies, regulators, or enterprises) to consider solutions which offer a win/win proposition for business growth and equitable access for ALL King Island residents.

Direct Economic Impacts Summary

The reported direct economic impacts identified by the participants in this analysis are listed below:

- Travel costs:
  - $1,000/trip: Councillors travelling to the mainland for meetings
- Participation issues (e.g. councillors cannot join SIGs, FoodWorks cannot stream content, remote working is not practical for clerical workers, excluding them from opportunities)
- Slow speed of software costs businesses time. Examples reported include:
  - Currie FoodWorks estimated that managers need an additional 2 man-hours per day performing computer-related tasks.
  - Ballarat and Clarendon College estimated administrators need an additional 1-3 man-hours per day performing computer related tasks
- Television and Radio must be rebroadcast at the ratepayers' expense, as follows:
  - $7,500 - 8,000 per annum for digital TV provision
  - $1,000 per annum for radio provision
  - Depreciation on a hardware investment of $18,500
- Online orders for King Island goods and services fail to complete. For example King Island Sea Salt reported multiple instances of online orders for their products (using IM) failing before the order could be completed.
- The costs of installing and maintaining 3G signal-boosting equipment disadvantage remote workers on King Island.

- Lack of carrier competition has resulted in the better-value data plans available on the mainland not being available, and much higher prices are being paid for data on King Island.
- Inability to use government portals (e.g. the ATO and Centrelink websites) and to access the cloud at reasonable speeds, lead to both regulatory and productivity issues.
- Tourists cancel bookings upon learning that 3Gcoverage is not available across King Island. There have been cases of entire groups cancelling for this reason.
- Where regulatory obligations prevent data being sent over 3G, organisations must send data over the (much slower) copper network, in the absence of other options.
- Organisations have been forced to provision staff with GPS trackers and/or satellite phones (which cost upwards of $800 per unit).
- Organisations have been forced to provide staff with more expensive “blue tick” mobile handsets to maximise what coverage does exist on King Island.
- Organisations not based on King Island (e.g. the scheelite mine, TasPorts, Hydro Tasmania) must develop separate systems to manage IT resources on King Island, because the bandwidth is insufficient for remote solutions. This entails:
    - Additional hardware and software costs
    - Additional resources (staff) on the island
    - Management overheads due to exception handling for King Island systems which differ from the rest of their networks

Indirect Economic Impacts Summary

The reported indirect economic impacts identified by the participants in this analysis are listed below:

- Familiarity with the digital workplace cannot be built up in the workforce, resulting in employers being unable to recruit staff, who have had exposure to broadband connectivity. Staff must therefore be "walked" through even the most basic tasks, most people in urban areas take for granted in the workplace.
- Training and education provision is impacted:
    - Councillors cannot participate in video links for training purposes (as is common for councillors on the mainland)
    - King Island High School cannot stream content or offer interactive lessons, putting learners at all levels at a disadvantage
    - Ballarat & Clarendon college have had to divert funds from provision of hiking equipment to equip their hiking groups with satellite transponders for health and safety reasons
- Visitors to the island often gain an immediate negative impression of the island, especially as a vacation destination for an "always on" business leader (such as the two new golf courses hope to attract). Examples include:
    - Immediately upon arrival, non-Telstra devices cannot connect at all.
    - Immediately upon arrival, Telstra devices may show 5 bars in the arrival hall, but be unable to place a call due to congestion.
- Infrastructure cannot be used to its potential. For example, King Island Council has been offered the use of videoconferencing hardware (worth many thousands of dollars) but cannot make use of the hardware due to lack of bandwidth at council chambers.
- Businesses are impacted when staff cannot call in sick – sometimes they also cannot call the potential replacement staff either.
- Additional OH&S measures can be required – for example training and briefings for staff engaged in remote activities beyond the range of 3G signal.

Environmental & Health Impacts Summary

The reported environmental impacts identified by the participants in this analysis are listed below:

- Materials that would normally be distributed to staff or learner devices over 3G must instead be printed separately for each learner/staff member.

- Additional flights to Tasmania and mainland Australia are required due to practical videoconferencing facilities being unavailable. This has an impact on organisations' carbon footprint.

- Additional automobile trips for face-to-face meetings are required on King Island, due to practical videoconferencing facilities being unavailable, and the unreliability of the 3G network. This has an impact on organisations' carbon footprint.

- Information storage is more vulnerable due to lack of practical cloud storage. This was demonstrated by the loss of King Island residents' prescription histories following the fire which destroyed Currie pharmacy in January 2015.

- Medical emergencies in remote areas are more serious and carry additional risks: For example, the casualty may need to be left while a companion treks to a location with 3G signal to call for help.

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