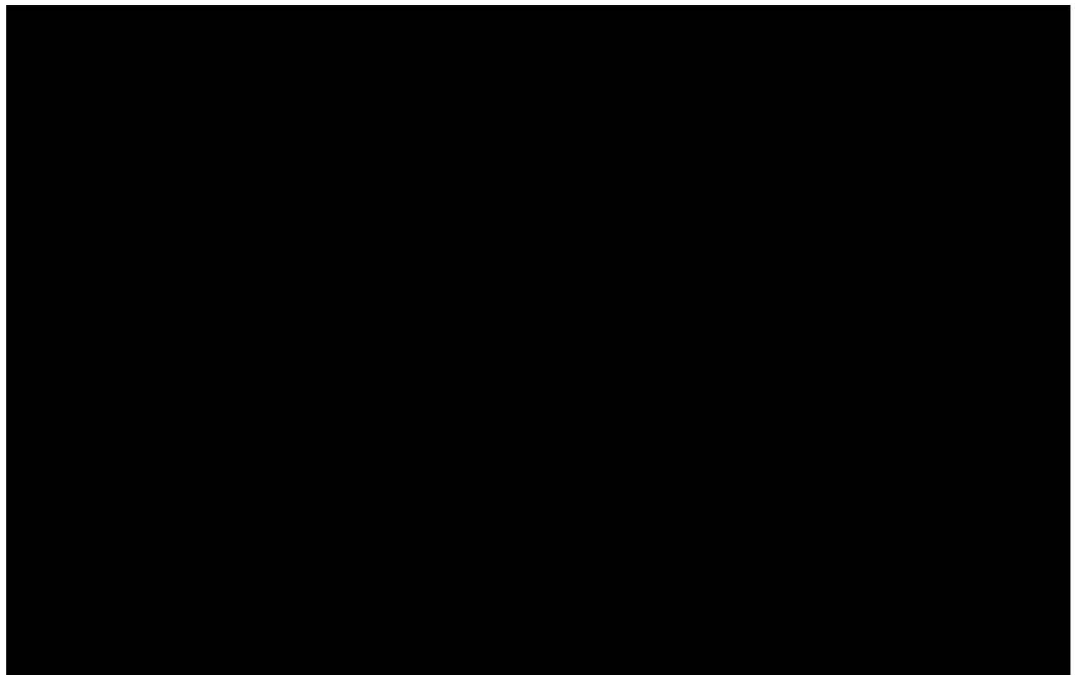


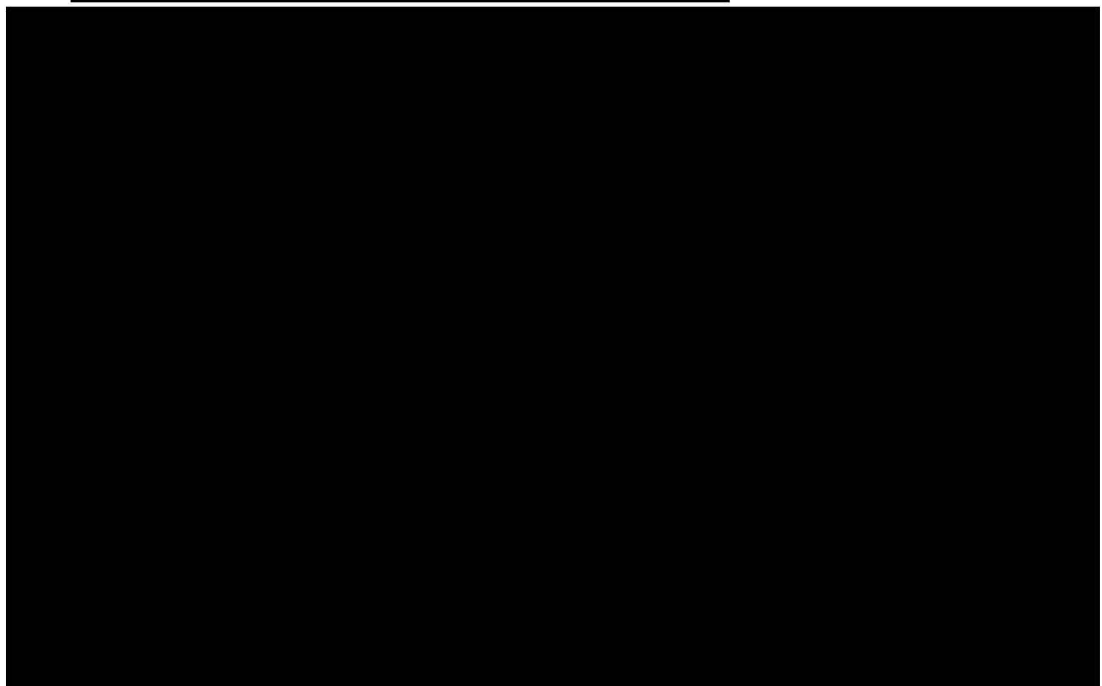


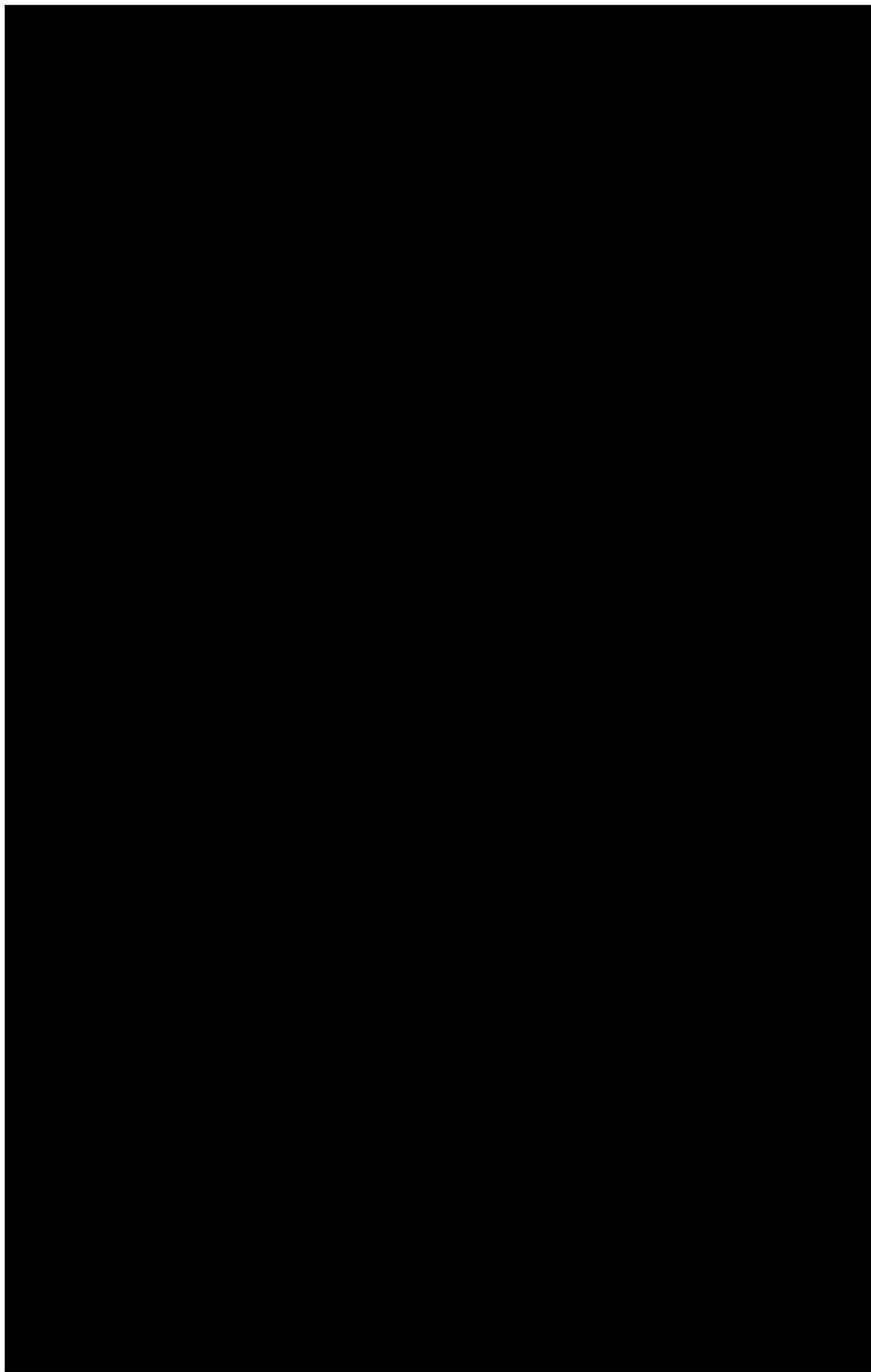
*(continued)*

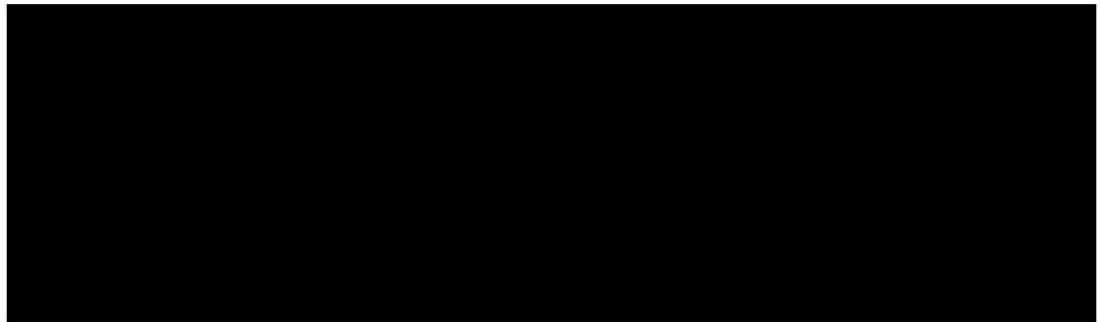


- (b) *Provide all documents evidencing TPG's assessment of the commercial viability of providing FWA services under the MOCN Agreement.*

[Redacted text block]







[Redacted]  
[Redacted]

- (c) *Provide an estimate of the total number of FWA services that TPG expects to provide in the 17% Regional Coverage Zone during the initial term of the MOCN Agreement.*

[Redacted]  
[Redacted]

- (d) *Provide all documents evidencing TPG's estimate of the total number of FWA services that it expects to provide in the 17% Regional Coverage Zone during the initial term of the MOCN Agreement.*

[Redacted]  
[Redacted]

**2. Provide the total number of current TPG 4G FWA services in the 17% Regional Coverage Zone.**

As at 31 August 2022, TPG has approximately [Redacted] 4G FWA customers in the 17% Regional Coverage Zone.

**3. Future technological developments**

- (a) *Please identify, for both metropolitan areas and the 80%+ coverage area: (i) the approximate year you expect each MNO to launch 6G in both a future with the Proposed Transaction and a future without the Proposed Transaction, and the basis for that view; (ii) the growth in data demand and anticipated technological responses in the telecommunications sector you expect to occur over the next 5 to 12 years, and the basis for that view; and (iii) to the extent not identified in your response to (ii), the developments you expect to occur in respect of neutral host services and low earth orbit satellite services over the next 5 to 12 years, and the basis for that view.*

- i. **The approximate year you expect each MNO to launch 6G in both a future with the Proposed Transaction and a future without the Proposed Transaction, and the basis for that view**

A new mobile technology cycle (including 6G) involves the following steps:

- The International Telecommunication Union Radiocommunications Sector (ITU-R) establishes requirements that the next generation of cellular technology needs to meet.
- Once these requirements are established by the ITU-R, a standards group (such as the 3rd Generation Partnership Project (3GPP))<sup>1</sup> proposes a standards release to satisfy the requirements.
- Once the standards are released for a new generation of technology, vendor roadmaps follow to allow for deployment of the new technology.

There is currently no date for these events in relation to 6G. However, TPG expects that 6G deployments in Australia will occur immediately once compliant vendor solutions are available which is likely to be sometime from 2030 onwards.

TPG does not expect that the Proposed Transaction will affect Telstra's or Optus' plans for 6G deployment once available. It expects that each of Telstra and Optus will fiercely compete on a network level, including through rolling out new generational technology. It also notes that Optus will not be affected by the Huawei ban in relation to the future deployment of 6G as it will have removed remaining Huawei equipment when its sites are upgraded to 5G technology.

In relation to TPG:

[REDACTED]

- [REDACTED] To the extent that at 10 or 15 years, TPG chose to exit the Agreements,

<sup>1</sup> The 3GPP unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC) and provides their members with a stable environment to produce the reports and specifications that define 3GPP technologies. See <https://www.3gpp.org/about-3gpp/about-3gpp>

it would have many options in place to provide 5G and 6G services in the 17% Regional Coverage Zone and have had time to develop these options, given the non-exclusivity of the Agreements and the 36 month transition out period. For example in 10 to 15 years,:

- TPG would have a materially enhanced business case for rolling out 5G and 6G in the 17% Regional Coverage Zone [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]
- LEO satellite solutions are likely to facilitate lower cost mobile backhaul which is crucial to providing regional and rural network coverage; and
- active equipment neutral host providers may be a more commonly available option and TPG will also have options to enter into other forms of network sharing.

None of these options are mutually exclusive.

ii. **The growth in data demand and anticipated technological responses in the telecommunications sector you expect to occur over the next 5 to 12 years, and the basis for that**

TPG considers that the demand for data is likely to grow by around [REDACTED].

Each new technology generation has pushed the adopted frequencies up higher to manage capacity requirements, e.g. 5G has “FR2” which involves using the 26GHz millimetre wave band. The additional capacity of 6G will not necessarily be the quantum leap seen with massive MIMO technology; however TPG expects that future spectrum releases along with newer generations of cellular technology with greater “spectral efficiency” will be used to meet the capacity demands associated with increasing data usage.

iii. **The developments you expect to occur in respect of neutral host services and low earth orbit satellite services over the next 5 to 12 years, and the basis for that view**

*LEO satellite services*

LEO satellites circle the earth in orbits of up to 2,000km moving their communication beams as they move over the surface of the earth. In concert with other satellites, LEO satellites bring high-speed, low-latency



internet connectivity to areas where it was previously unavailable. There are a number of providers of LEO satellite services including OneWeb, Starlink, Iridium, Thuraya, Globalstar, Intelsat and Inmarsat.

TPG anticipates that LEO satellite providers will become more prevalent over the next 10 years. The 2021 Regional Telecommunications Review identified that LEO satellite services could '*disrupt existing market paradigms in regional areas by aggregating disparate thin markets into a single global market, challenging incumbent providers.*'<sup>2</sup> LEO satellite currently is used to provide mobile backhaul in regional Australia and connectivity to enterprise customers.

An increase in the uptake in LEO satellite services is already being seen in Australia. For example:

- In March 2022, Telstra announced that it had reached a memorandum of understanding with OneWeb which will allow Telstra to provide more connectivity across regional and rural Australia.<sup>3</sup>
- In January 2022, Field Solutions Group (a telecommunications provider that focuses on regional and rural areas) entered into a partnership with OneWeb to resell LEO satellite services to customers in Australia.<sup>4</sup>
- In December 2021, Vocus entered into a partnership with OneWeb to resell LEO satellite services to customers in Australia.<sup>5</sup>
- Pivotal uses LEO satellite networks such as Iridium and OneWeb to provide coverage in Australia.<sup>6</sup>
- Optus owns and operates a fleet of satellites across Australia and New Zealand, with 5 satellites currently in geostationary orbit. In September 2022, Optus also entered into a memorandum of understanding with AST Space Mobile to test direct satellite to mobile technologies.<sup>7</sup>

#### *Mobile Network Infrastructure Providers*

In recent years there has been a significant reduction in vertical integration of ownership of tower infrastructure, with the MNOs having sold all or most of their interests in towers in regional areas to various MNIPs including OMERS (which owns Stilmark) and ATN (which owns Axicom). MNIPs are incentivised to lease towers out to ensure a continuing revenue stream

<sup>2</sup> See page 62: <https://www.infrastructure.gov.au/sites/default/files/documents/2021-rtirc-report-a-step-change-in-demand.pdf>.

<sup>3</sup> See: <https://exchange.telstra.com.au/improving-connectivity-in-remote-areas-with-satellites/>.

<sup>4</sup> See: <https://www.verdict.co.uk/oneweb-vocus-fsg-australia/>.

<sup>5</sup> See: <https://www.vocus.com.au/news/oneweb-welcomes-vocus-as-first-distribution-partner-in-australia> and <https://www.crn.com.au/news/how-vocus-plans-to-use-leo-satellites-to-change-how-it-delivers-govt-services-579950>.

<sup>6</sup> See: <https://www.pivotal.com.au/our-networks/iridium/#>.

<sup>7</sup> See CommsDay, 15 September 2022.



and it is, therefore, commercially logical that MNIPs will be keen to establish any MNO as a customer over the next five to 12 years and would fiercely compete with each other on price.

*Neutral host services*

Active equipment neutral host services are also emerging as a potential option for MNOs. For example, the Department of Regional NSW has engaged TPG and others to undertake design and commercial modelling to test the feasibility of deploying active neutral host RANs on new mobile towers. While active neutral hosting is currently in its nascent form, TPG considers that it will be a potential option for it in future as one of a number of options for expanding its coverage.

- (b) *Please identify, in both a future with the Proposed Transaction and a future without the Proposed Transaction, the likely impact you consider any developments identified in your response to (a) will have on competition over the next 5 to 12 years and the basis for that view, including: (i) impact on scale and cost of infrastructure investment by MNOs; (ii) impact on competition for network quality (including speed); and (iii) impact on competition for coverage*

At the outset, it is difficult to predict with precision what will occur in relation to mobile technology over this period given the highly dynamic nature of the industry. It is however predictable that—based on how the industry has developed to date—there will be significant innovation over this period and the options available for providing coverage in 10 years will be more wide reaching and advanced than available today.

Under the Agreements, TPG has the option to transition out of the MOCN at Year 10 and Year 15 (over a three year transition out period) should it choose to do so. Importantly, it is also able to continue with the Agreements. This means that TPG will be able to weigh the costs and benefits of continuing with the Agreement at these points in time against those associated with alternatives available to it. This gives it significant optionality and flexibility to determine what is in its and its customers' best interests in 10 and 15 years. At these points in time, it considers the options available to it for offering regional coverage will be significantly greater than available today. Those options include co-location of 5G and 6G RAN equipment on MNIP towers, LEO satellite solutions, active equipment neutral hosting and alternative network sharing arrangements. These options are not mutually exclusive and TPG expects that, should it choose to exit the Agreements at 10 or 15 years, it would adopt a mix of strategies to provide regional coverage.

[REDACTED]

[REDACTED]

TPG considers that the reduction in vertical integration of owners of towers, the increasing use of LEO satellite technology and a move to neutral host models will have a positive impact on competition in the retail and wholesale mobile markets over the next five to 12 years as these developments offer alternative means of providing coverage and, hence will increase the options available to retailers seeking to offer mobile services across regional Australia. In particular, and as explained above:

- there has been an increase in the take up of LEO satellite services in Australia to provide mobile backhaul. TPG expects that this trend will increase over the next five to 12 years and lead to reducing costs for LEO satellite services and increased dynamic competition. LEO satellites can be used to deliver low latency and high speed services – in March 2021, UK LEO satellite provider OneWeb demonstrated speeds of 500Mbps and 32ms latency in tests with their fleet of satellites;<sup>8</sup>
- MNIPs will be incentivised to provide access to passive infrastructure on competitive terms which will be advantageous to MNOs seeking to co-locate their RAN equipment on existing infrastructure. Passive infrastructure sharing could also be expanded beyond tower sharing to include other assets such as shelters and power, which will reduce MNO costs; and
- active sharing through a neutral host is another potential option for decreasing network costs in future.

TPG does not expect the Proposed Transaction to have any material impact on the developments in respect of LEO satellite technology or neutral host models. The Proposed Transaction relates only to 17% of Australia's population and it is unlikely that dynamic innovation will be materially impacted by a non-exclusive network sharing arrangement in respect of this region. It is also clear that these developments are relevant to telecommunication providers beyond TPG, including the other MNOs, Pivotal and Vocus. Therefore, the Proposed Transaction between TPG and Telstra is unlikely to have any material (if any) impact on the developments identified in (a) above.

**4. Lack of synergies between TPG and Optus for alternative active network sharing arrangement in 80%+ coverage area**

- (a) *Please explain the extent of any lack of synergies between TPG and Optus arising from the nature of each party's spectrum holdings in the 80%+ coverage area. In particular, please confirm the following. (i) lack of contiguity of Optus and TPG*

<sup>8</sup> See: <https://www.verdict.co.uk/oneweb-vocus-fsg-australia/>.

700MHz spectrum; [REDACTED]

TPG confirms the propositions set out in Question 4.

i. **Lack of contiguity**

Spectrum within a specific band (e.g. 700MHz) that is allocated to licensees at auctions run by ACMA will have different frequencies. Where the frequencies allocated to one licensee is adjacent to the frequency allocated to another licensee, their spectrum holdings in the band (i.e. 700 MHz) are contiguous. By contrast, if there is a gap between the frequencies held by two licensees within a particular band (including because a third party may hold the frequency that lies between their holdings), their spectrum holdings within that band are not contiguous.

Optus and TPG's 700MHz spectrum holdings are not contiguous with Telstra holding the frequency that sits between Optus' and TPG's spectrum holdings in the 700MHz band – by corollary, TPG and Telstra's 700MHz holdings are contiguous.

Broadcasting contiguous spectrum from a shared RAN is more cost efficient and enhances performance, as it allows for faster data rates, lower latency, and improved spectral efficiency (allowing more capacity in the same amount of spectrum).<sup>9</sup>

<sup>9</sup> Spectrum efficiency describes the amount of data transmitted over a given spectrum or bandwidth with minimum transmission errors. Also known as spectral efficiency or bandwidth efficiency, a cellular network's spectral efficiency is equivalent to the maximum number of bits of data that can be transmitted to a specified number of users per second while maintaining an acceptable quality of service.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- (b) *Please explain whether, in light of any lack of synergies identified in response to (a), this would be a material impediment to active network sharing between TPG and Optus in a future without the Proposed Transaction. In doing so, please explain whether a lack of synergies in spectrum holdings would impact the feasibility of a MORAN deal between these parties (as distinct from a MOCN deal) and the basis for that view, and possible solutions.*

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



[REDACTED]

## 5. Questions in relation to capital expenditure for site establishment

- (a) Provide the number of sites that TPG currently has in: (i) the 0 – 81% population coverage zone, and (ii) the Regional Coverage Zone

TPG currently has 4189 sites in the 0-81% population coverage zone.<sup>10</sup> TPG currently has 749 sites in the 17% Regional Coverage Zone.<sup>11</sup>

- (b) Provide the indicative cost of establishing a site in: (i) the 0 – 81% population coverage zone, and (ii) the Regional Coverage Zone, and identify how this cost is calculated (what proportion of the cost is site establishment, equipment, backhaul etc.)

Prior to entering into the Proposed Transaction—in order to assess the costs involved in the Proposed Transaction compared with greenfield builds across the 17% Regional Coverage Zone—TPG estimated the cost of building a greenfield 5G [REDACTED]

[REDACTED]

[REDACTED]

| Site location              | Electronics <sup>1</sup> | Build services <sup>2</sup> | TX <sup>3</sup> | Mobilisation <sup>4</sup> | Total <sup>5</sup> |
|----------------------------|--------------------------|-----------------------------|-----------------|---------------------------|--------------------|
| 0-81% coverage             | [REDACTED]               | [REDACTED]                  | [REDACTED]      | [REDACTED]                | [REDACTED]         |
| 17% Regional Coverage Zone | [REDACTED]               | [REDACTED]                  | [REDACTED]      | [REDACTED]                | [REDACTED]         |

### Notes:

1: 'Electronics' means active RAN equipment that is purchased [REDACTED]. This includes the base station, active antennas and Remote Radio Units.

2: 'Build services' means the deployment services required to implement the solution. The main elements of this are design and planning, construction, passive equipment, integration and acceptance.

<sup>10</sup> This does not include small cells or in building coverage solutions.

<sup>11</sup> This includes Frequency Shifting Repeaters, but does not include small cells or in building coverage solutions.



3: 'TX' means the cost of deploying transmission to the site [REDACTED]

4: 'Mobilisation' means the Living Away From home Allowance (LAFHA) costs involved with contractors and employees working on sites in regional or rural areas.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(c) *Provide the average operating expenditure for sites in: (i) the 0 – 81% population coverage zone, and (ii) the Regional Coverage Zone*

TPG's best estimate of the average costs of operating a sole risk 5G site are set out in Table 6 below. Operating costs can, however, vary significantly between sites for a number of reasons including the amount of electricity required to operate a site, whether the site is 5G enabled or not (noting electricity costs are higher for 5G sites), the rent payable to the third party tower owner and vendor contracts for O&M.

*Table 5: Annual cost of operating 5G greenfield sites*

| Greenfield                 | Rent <sup>1</sup> | Electricity <sup>2</sup> | O&M <sup>3</sup> | Total |
|----------------------------|-------------------|--------------------------|------------------|-------|
| 0-81% coverage             | [REDACTED]        |                          |                  |       |
| 17% Regional Coverage Zone | [REDACTED]        |                          |                  |       |

**Notes:**

- 1: 'Rent' means rent provided to the tower owner that provides passive infrastructure.
- 2: 'Electricity' means the cost of providing electrical power to the site.
- 3: 'O&M' means the costs involved in operating and maintaining the active equipment.