Appendix M

Visual and Wilderness Impact Assessment

Hydro Tasmania

We acknowledge and respect the palawa/pakana peoples of lutruwita (Tasmania) and the Aboriginal and Torres Strait Islander Peoples across Australia as the traditional custodians of our shared lands, waters and seas.

We recognise their unique ability to care for Country and their deep spiritual connection with the land, waters and seas – the same land, waters and seas which are a central focus of our profession.

We honour Elders past and present whose knowledge and wisdom will ensure the continuation of Aboriginal and Torres Strait Islander cultures.

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1. BACKGROUND

Tasmania's landscape is highly diverse and noteworthy for its spectacular beauty. The importance of the scenery to our sense of who we are as Tasmanians has played out politically throughout the history of the State and remains a potent issue of debate in the 21st century. For this reason, due consideration needs to be given to any development that might irrevocably damage the scenic quality of Tasmania's landscape that underpins the State's brand.

Hydro Tasmania proposes to redevelop existing hydropower assets at Tarraleah (Map 1.1) to deliver greater value from the water resource. Hydropower is a critical part of the energy generation and storage in the National Electricity Market. Boosting the capacity, operational flexibility and energy output at Tarraleah is a key part of delivering a stable, reliable grid.

Some of the proposed works may be visible from the Tasmanian Wilderness World Heritage Area (TWWHA) and part of the scope of this report is to analyse possible impacts on wilderness values. While this development is not inside the TWWHA, the TWWHA Management Plan (TWWHAMP) requires developers to assess any activity that may cause adverse impacts on the reserve's aesthetic and wilderness values. The aim of the TWWHAMP is to advance the vision for the management of the World Heritage Areas "to identify, protect, conserve and present … the World Heritage, National Heritage and other natural and cultural values of the Tasmanian Wilderness World Heritage Area…"[1]. One of the Key Desired Outcomes (KDO) of the TWWHAMP is that the "aesthetic qualities of the TWWHA are maintained and improved" (KDO 5.8). KDO 5.8 lists the need to design new facilities to blend into their locations[2]. The evaluation indicator for this action is for the impact of new facilities on aesthetic values to be minimised[3].

1 DPIPWE 2016. Tasmanian Wilderness World Heritage Area Management Plan. Department of Primary Industries, Parks, Water and Environment, Hobart. pg 35.
2 Op. cit. DPIPWE 2016 pg 118.
3 Op. cit. DPIPWE 2016 pg 123.

Map 1.1 Redevelopment in the Landscape Context

Key Rivers
Key Roads
Tarraleah Redevelopment

0 1 2 km

Prepared using theLIST ©State of Tasmania

Map 1.1 Tarraleah redevelopment in the landscape context.

Hydro Tasmania is seeking through this study to understand the potential landscape and visual impacts of the proposed redevelopment (the LVIA). An accepted, replicable method of analysis has been applied to understand the nature and scale of impacts and to identify opportunities to eliminate or mitigate significant impacts which affect the landscape character of the place where these occur.

This study applies the techniques of visual impact analysis management employed by multiple agencies around the world. In general, visual landscape management seeks to retain the established character of the landscape. In many landscapes, change is expected as resources are developed, and patterns of settlement evolve. While visual variety is valued, alterations that permanently or temporarily deviate from the existing character are considered a visual impact.

The analysis herein has been informed by:

- desktop review and preliminary reporting and assessment prior to this draft;
- GIS and seen view analysis by Entura;
- two-day field visit to the study site; and
- a preliminary visual impact analysis by Hydro Tasmania staff to identify opportunities to limit the significance of impacts which influences the redevelopment design investigated here by Inspiring Place.

This report uses the word 'wilderness' because of its importance to the impact assessment process. Although there is no legislative definition of wilderness, the TWWHAMP defines wilderness as "an area that is of sufficient size, remoteness and naturalness to enable the long-term integrity of natural systems, diversity of processes, the maintenance of cultural landscapes and the provision of a wilderness recreation experience"[4]. Environmental NGOs have added that wilderness should be thought of as[5]:

- the degree to which it is undisturbed by and remote from impacts, points of mechanised access, and permanent habitation;
- land that has a high degree of wilderness character; and

4 Op. cit. DPIPWE 2016 pg 175.
5 eNGOs submission 2015. UNESCO Reactive Monitoring Mission to the TWWHA, November 2015. https://tnpa.org.au/wp-content/uploads/2017/08/Managing-wilderness-character-of-the-TWWHA-2015.pdf Accessed 01.07.2024.

> land with a high degree of wilderness character that is surrounded by land or sea with a lower degree of wilderness character, but this transitional land is necessary for maintaining the wilderness character of the high value wilderness[6].

The scope of this report does not extend to European or Aboriginal heritage values. The ongoing cultural connections of Tasmanian Aboriginal people to land and waters in Tasmania is recognised. The long activity of Aboriginal people in the area has helped shape these landscapes. Their presence in the landscape is apparent today in elements such as the vegetation types and coverage that were managed by burning regimes. Knowledge of intangible elements is held by Tasmanian Aboriginal people, including stories, songs, language, and rituals. Care should be taken during works not to disturb land and vegetation unnecessarily. Any unanticipated discoveries need to be reported[7].

6 It is important to note that Aboriginal custodianship and practices continue in areas that non-Aboriginal people call wilderness. The concept of wilderness has been challenged for some time and is slowly changing to be more inclusive of Aboriginal presence over millennia and continuing to the present day. See Pickerill, J. 2008. From wilderness to Wild Country: the power of language in environmental campaigns in Australia. Environmental Politics, 17(1) 95-104, DOI: 10.1080/09644010701811681.
7 Aboriginal Heritage Tasmania 2024. https://www.aboriginalheritage.tas.gov.au/Documents/UDP.pdf Accessed 01.07.2024

2. METHOD OF ANALYSIS

2.1 Approach to the LVIA

There is a long history of visual values assessment and management dating from the 1960s in the United States. In Tasmania, the US system was largely adopted by the Forestry Commission Tasmania (now Sustainable Timber Tasmania) to guide its practices since the 1980s. The Forestry Commission published its methods in *A Manual for Forest Landscape Management*[8] in 1990 (revised 2006).

The Forestry Commission system has since been the primary visual management tool employed by Tasmanian planning professionals with modification over time to account for contemporary best practice techniques including extensive use of Geographic Information Systems (GIS). Those working in the discipline have applied the system to the evaluation of the visual impact of transmission lines, wind farms, telecommunications facilities, heavy industry, residential development, pumped hydro, waste disposal operations and tourism attractions and to the planning of regional landscapes.

The system of analysis used herein, draws heavily on these works (Figure 2.1) and is premised on an analysis of factors that determine how people react to changes to the visual qualities of a place. The method evaluates several influences including the:

alteration type –the scale, character and location of the proposed redevelopment (Section 3);

landscape context - the biophysical and social factors that combine to create the landscape character (Section 4.1) and scenic quality of the setting (Section 4.2);

viewing disposition – who sees what, from where and how often (Section 4);

the inherent capacity of the landscape to incorporate an alteration without impact or its 'visual absorption capability' (Section 4);

8 Forestry Commission Tasmania 1990 (reprinted 2006). A Manual for Forest Landscape Management Forestry Commission of Tasmania, Hobart.

landscape sensitivity – a gauge of the contribution a landscape makes to the sense of place, and the sensitivity of an area to the alteration of its character (Section 4); and

magnitude of impact – the degree to which a proposed alteration changes the scenic attributes of the landscape that alter the viewing experience (Section 4).

Together these factors lead to an understanding of the significance of the impact and the need for targeted mitigation.

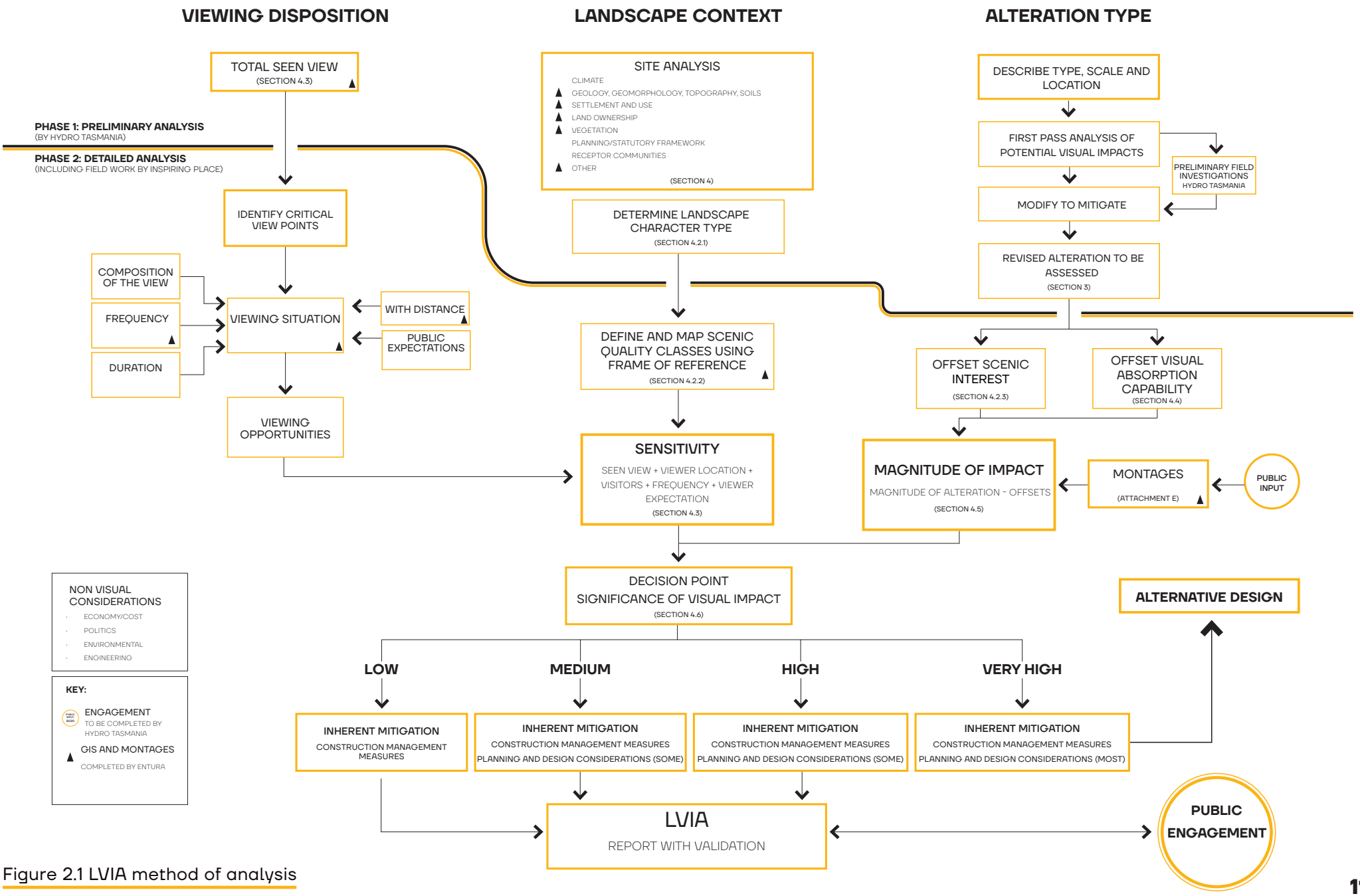


Figure 2.1 LVIA method of analysis

The proximity of the Tasmanian Wilderness World Heritage Area meant that a wilderness impact assessment was also be required (Section 5).

The analysis reported here has been supported by work undertaken by Entura on behalf of Hydro including:

- GIS analysis of the seen view in this report (Attachment A), and
- preparation of geo-spatially accurate photomontages from prominent and frequented viewpoints (Attachment E).

Note that the mapping herein is limited by the resolution and scale of the presentation format. The maps herein result from a GIS analysis which has a much greater resolution that can only be interrogated on screen or in larger format maps. Modelling was done for the whole redevelopment to a distance of 25km from any part of the proposed infrastructure.

The montages have been used as a point of reference in the evaluation of impact described herein. The montages were chosen for their capacity to illustrate the potentially more impactful views to the surge tower from Tarraleah village and Mount King William. Montages are not an assessment method in themselves as they illustrate a point in time under a particular lighting condition. Rather, they are an aid in illustrating to the community the scale and form of the proposed redevelopment at specific viewpoints perceived to be of concern to the consultants.

The reader should be aware that the visual quality of the landscape is only one element of how it is seen. Researchers have consistently shown that people's emotional attachments and the cognitive meanings they 'see' in the landscape affect their perception of the beauty of a place and how this can be analysed. Multiple sensory inputs, cultural background and personal experiences all affect how a viewer responds to a scene[9].

To fully understand the 'aesthetics' of a place requires a multi-dimensional analysis that:

- defines and analyses the physical attributes of the place;
- examines the social attachments people have with it; and

9 Van Heijgen, E. 2013. Human Landscape Perception: Report on Understanding Human Landscape Perception and How to Integrate and Implement this in Current Policy Strategies report to the AONB High Weald Unit, United Kingdom.

looks at how human activities and the nature of the place combine to make a 'cultural landscape'.

In professional planning three interrelated skill sets have developed to cover this range of activities:

visual management which systematically analyses the compositional elements of the landscape (as in this report);

social values assessment which uses a phenomenological approach[10] to the evaluation of personal meaning to the appreciation of the visual value of the landscape – information that is typically gleaned from community engagement but also through review of artistic sources, myth, legend and local folk lore; and

cultural landscape assessment which uses historical analyses to understand the layers of activity that influence a landscape setting.

The detailed analysis of the latter two of these variables are outside the scope of this report. However, social values have been considered to some degree based on the consultant's understanding of these values gleaned through their life-long/long-time association with Tasmania as their residence, through numerous community engagement processes in planning, recreation and tourism undertaken over 40 years of practice work and 1200 projects in the State including across the study area.

Nonetheless, by focusing on the visual elements of the landscape and the contrast between what is and what could be, the visual management system herein aims to provide a reliable, valid and representative mechanism for evaluating the aesthetic of the landscape and potential impacts to it.

2.2 Planning approvals

Development must comply with the *Land Use Planning and Approvals Act 1993* for local government planning approval under the *Central Highlands Interim Planning Scheme 2015*. The study site falls into several zones, including Recreation (28.0), Village (12.0), Rural (20.0), Utilities (26.0), and Environmental Management (23.0). The whole landscape is covered by the Bushfire-prone Areas Code (13.0). The Waterway and Coastal Protection Code (7.0) is in effect around waterways. There are many slopes in the landscape classified as Landslide Hazard Area (15.0).

10 Phenomenology is the study of human experiences, behaviours, situations and meanings as they arise in a person's everyday life i.e. their lifeworld, which is taken for granted, normally unnoticed and thus hidden as a 'phenomenon'. Various techniques of evaluating people's 'lifeworld' have enabled an identification of those places that have 'social value' to someone's daily life and therefore of consideration in an investigation of the impacts of a development.

The Board of the Environmental Protection Authority has deemed the redevelopment to be class 2C and requiring an Environmental Impacts Assessment. This report is the visual and landscape assessment component of the EIA.

Wilderness values are protected in Schedule 1 of the *National Parks Reserve Management Act 2002* under management objective 1(j) to preserve the natural, primitive and remote character of wilderness areas[11].

Consideration will need to be given as to whether the redevelopment might be a controlled action under the federal *Environment Protection and Biodiversity Conservation Act 1999*. The probable trigger would be the presence of nationally listed species or ecological communities or impacts on World Heritage property.

The approach to the evaluation of visual and wilderness impacts herein is consistent with the concerns of the above legislative requirements in that the report has been prepared by a suitably qualified person using techniques of evaluation commonly applied in the industry.

11 National Parks Reserve Management Act 2002. legislation.tas.gov.au/view/html/inforce/current/act-2002-062 Accessed 16.07.2024

3. THE PROJECT AND ALTERATION TYPE

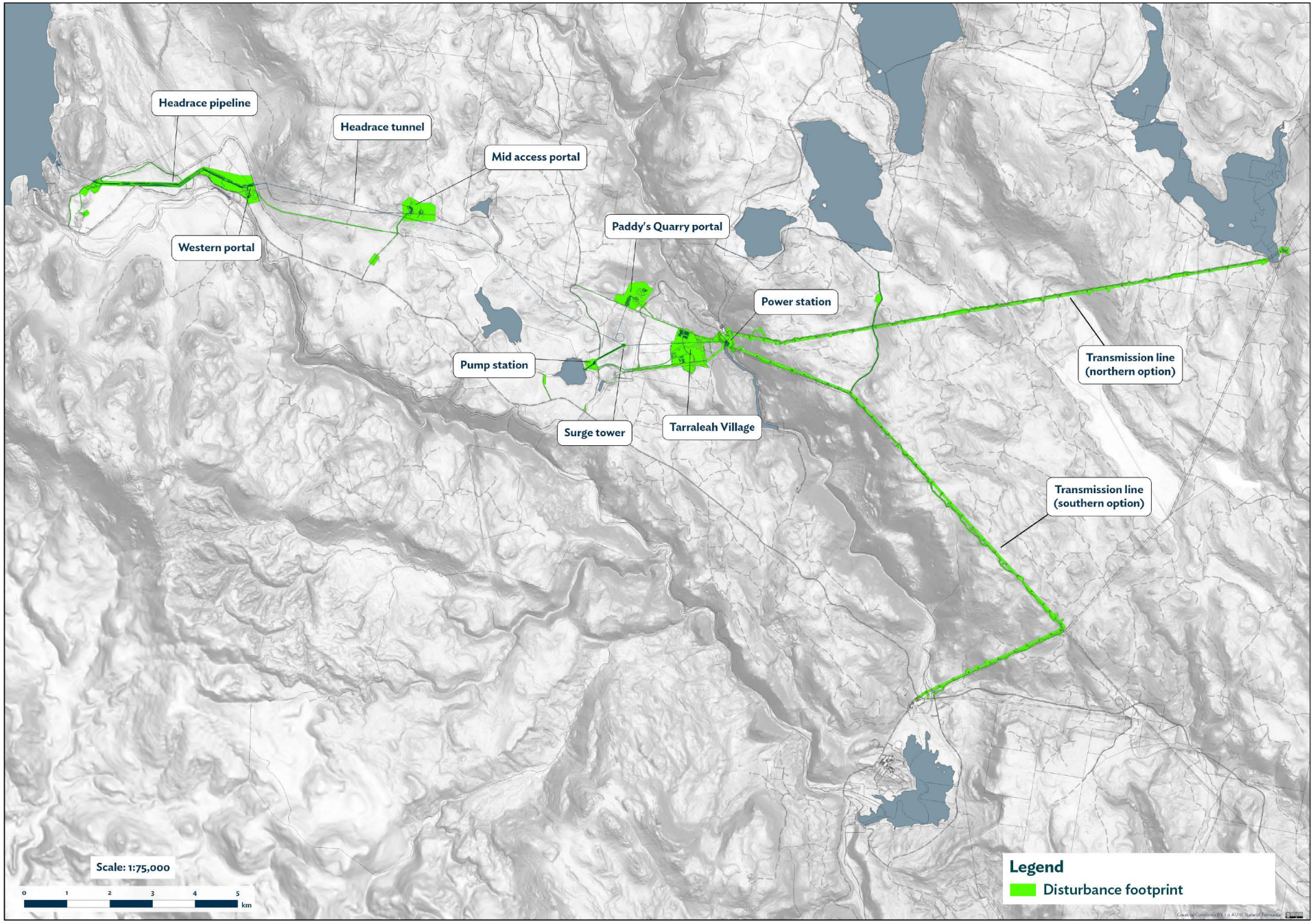
The Tarraleah scheme was commissioned in the 1930s and contributes about 6.5% of Hydro Tasmania's total energy production (630 gigawatt hours per year (GWh/y))[12]. The proposed works (hereafter, the redevelopment) are an important part of reconfiguring the site to maximise the use of the water resource and enable more flexibility and responsiveness in the scheme's operation.

The redevelopment is in the Central Highlands local government area, near Tarraleah village, and extends from Lake King William to the south of Dee Lagoon. The Project area includes all the land on which the redevelopment works will be undertaken. Within the Project area, a disturbance footprint has been defined (Map 3.1).

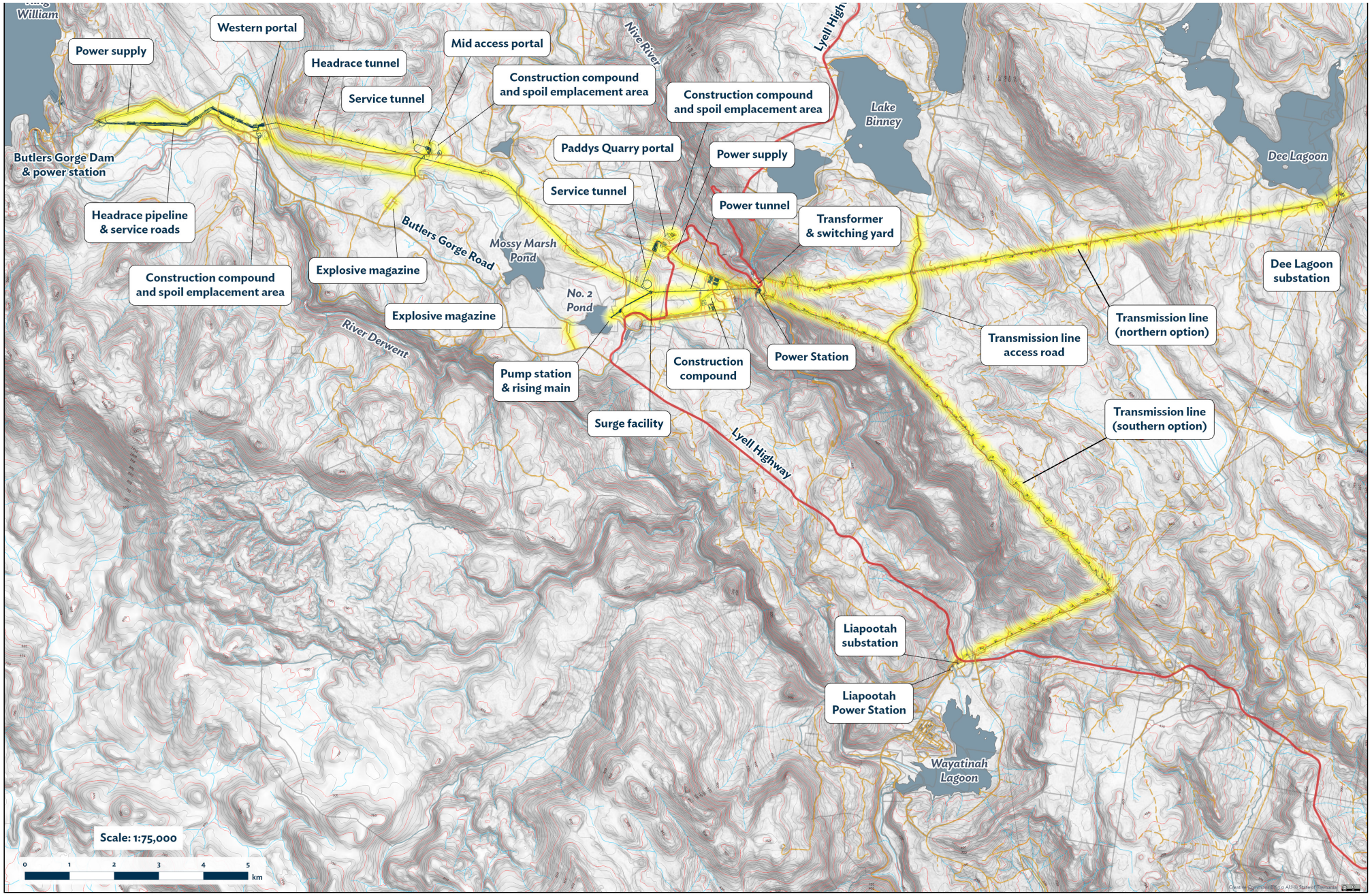
The disturbance footprint comprises any land that may be physically disturbed by the construction of the Project. The disturbance footprint excludes land that may be used for the Project which will not be physically disturbed e.g. use of the existing transmission line easement as part of the easement for the new transmission line or ongoing use of existing elements of the Tarraleah Hydropower Scheme, such as sections of No. 2 Canal. The disturbance footprint represents the maximum extent of where disturbance may occur and allows for potential future refinement to the Project's design and construction method. The disturbance footprint has been derived from the Project's reference design and construction methodology. Hydro Tasmania intends to develop the Project using an EPC contracting method and the Project design and construction methods will continue to be refined prior to the commencement of construction. The actual area physically disturbed by construction the Project is likely to be less than, but within, the disturbance footprint.

Map 3.2 presents the layout of the key elements of the proposed redevelopment. Lasting elements of the redevelopment include a new pipeline, tunnel and access portals, access tracks, and surge facilities as well as a new power station on the Nive River. A combination of permanent and temporary spoil stockpiles (spoil emplacement areas) will be required for construction and operation. Temporary facilities including laydown areas, and accommodation for workers, site offices, and workshops (referred collectively as construction compounds), will be built to enable construction and will be later dismantled and sites rehabilitated and revegetated.

12 Hydro Tasmania 2002. Hydro system improvement. https://www.hydro.com.au/clean-energy/battery-of-the-nation/hydro-system-improvement Accessed 27 Jun 2024



Map 3.1 Disturbance footprint of the Tarraleah redevelopment project (Source: Hydro Tasmania)



Map 3.2 Proposed layout of the Tarraleah redevelopment (Source: Hydro Tasmania)

The key visible components are the new tunnels and pipelines that connect Lake King William intake with the new power tunnel and surge tower, and the new power station. The redevelopment will be constructed in phases, and a package of works associated with site preparation, road improvements and construction camps has been developed.

Some of the larger elements of the redevelopment include:

- a headrace pipeline approximately 4.2km long up to 4m diameter;
- a 9.8 km low pressure headrace tunnel;
- a 2.3 km long low pressure power tunnel that splits into two short penstocks before entering the power station;
- a partially underground power station with an installed capacity of approximately 180 MW and rated flow of 60 m3/s located adjacent to the existing Tarraleah Power Station;
- a surge facility consisting of a 70 m high (above ground level) surge tower and associated underground approximately 140 m high surge shaft to control water pressure in the headrace and power tunnels;
- an approximately 6 m3/s pumping station and approximately 0.8 km rising main to transfer water from the existing No. 2 Pond to the power and headrace tunnels via the surge tower;
- a transformer yard and switchyard located close to the power station connecting the power station to the proposed transmission line;
- a new 22 kV power supply from the existing 22 kV network to the western, mid access and Paddy's Quarry portals, pump station, surge tower and power station will provide power during construction and operation;
- a new 220 kV transmission line. There are currently two transmission line options being considered:
    - a 14 km double circuit line from the existing Tungatinah Switchyard to the existing Dee Lagoon substation (northern option), or
    - a 15 km double circuit line from the proposed Tarraleah Switchyard to the existing Liapootah substation (southern option);

access tunnels, tunnel portals and access roads to provide access to the headrace and power tunnels. Excess spoil from tunnel, power station and portal excavations will be stored in one of three permanent spoil emplacement areas located at the western portal, mid tunnel access portal and Paddys Quarry portals.

Construction of the Tarraleah Redevelopment Project underground works will be completed using drill and blast techniques and may be supported by a tunnel boring machine. Above ground works will be completed by conventional earth moving and mechanical excavation. To support construction the following key temporary infrastructure is proposed:

- a construction compound at Tarraleah Village supported by smaller construction compounds located at each of the tunnel portals and the power station. Construction compounds will include site administration facilities and workshops, handle and store materials and equipment imported to site and concrete batching and crushing and screening plant;

- explosives for excavation work are required to be stored in a dedicated facility. Two explosive magazines will be located off Butlers Gorge Road;

- to facilitate construction of the power station a temporary bridge will built over the Nive River; and

- a workforce accommodation facility village will be constructed at Tarraleah but is not included in the scope of this assessment.

Upon the completion of works, all temporary construction sites will be rehabilitated.

The scope of the present landscape and visual impact assessment does not include the southern transmission line option, transmission line access road, explosives magazines, Tarraleah construction compound, Tarraleah B power station transformer and switching yard (Map 3.1).

4. LANDSCAPE CONTEXT AND SENSITIVITY

4.1 Site analysis - factors influencing the visual setting

4.1.1 Biophysical setting

A variety of biophysical factors influence the visual setting and potential impacts on wilderness values (Table 4.1). The macro-features described in the table below strongly influence the visual setting and sensitivity of the landscape to the redevelopment.

Table 4.1 Biophysical factors influencing the visual setting of the redevelopment. (Sources: Bureau of Meteorology; Land Information System Tasmania, Natural Values Atlas) (*continues following pages*).

Factor	Comment	Influence on the Visual Setting of the redevelopment
Climate	Cool temperate climate; average min 3.6C and average max 13.8C High precipitation at 1168mm per annum	Elevation 630m ASL, inland from the coast means the site is subject to frost and snowfall. Relatively cool temperatures and high rainfall results in slow growing but lush vegetation. Weather patterns create striking ephemeral atmospheric effects with frequent winter fogs and occasional snowfall and frosts.
Geology, Geomorphology and Topography	Fine to coarse grained Quaternary quartzite Land System of Tasmania – Undulating Plains, Hills and Mountains	Topographically varied site with many steep sections and landslide hazards. While lacking the dramatic views associated with Tasmania's iconic dolerite peaks, the landscape is nevertheless varied and interesting. Quartzite colour will potentially contrast with the surrounds when spoiled.

Factor	Comment	Influence on the Visual Setting of the redevelopment
Geoconservation	Western Tasmania Blanket Bogs (World Heritage significance) - small and large patches of organosol terrain are present around Mossy Marsh Tunnel, along Butlers Gorge Road, around Mossy Marsh & east of Fourteen Mile Road. Macrofossil site – Wilsons Creek plant fossils and other Cenozoic fossil sites	Blanket bog is dominated by low growing buttongrass and does not provide the visual screening of taller forest vegetation. It is however of global conservation significance because of its status as a key World Heritage value in its own right. Wilsons Falls macrofossil site, 1.6 km south of Tarraleah will not be impacted.
Surface Hydrology	The Tarraleah power station is located on the Nive River a tributary of the River Derwent. Artificial canals as well as a myriad of waterways	Frequent viewing opportunities to the Nive River from the Lyell Highway. Open aqueducts along Butlers Gorge Road are a visual feature of scenic interest.
Fire	Two large fires in the region in 2008 (Wilsons Creek) and in 1982 (Tungatinah) Thirteen smaller fires 0.14 – 14 ha in size in the period 1980-2022	Fire can temporarily or permanently change the visual setting by removing vegetation. Hot and repeated fires can alter the vegetation such that the succeeding overstorey/understory is different potentially altering its screening capacity.
Soils	Deep organosols (high organic content). Grey to dark brown in colour soils over most of the project site. Yellow brown soils at Tarraleah village region.	Low contrast between the soil colour and surrounding vegetation mean bare areas are unlikely to be highly visible from higher elevations in the seen view. Dark colours over most of the site but areas of yellow colour soils contrast with surrounding vegetation and will be visible from higher elevations.
Flora	Highly variable vegetation types in the area, reflecting the varied topography. Moorland, dry and wet eucalypt vegetation is dominant. Much of the forest is dominated by *Eucalyptus delegatensis.*	Any removal of forest and its screening potential, through bushfire, timber extraction or construction processes, could open views to new infrastructure. Care needs to be taken not to disturb existing vegetation given its high value as a screen to construction works in

Factor	Comment	Influence on the Visual Setting of the redevelopment
		views from roads as well as from natural areas, including the TWWHA.
Fauna	Tasmanian wedge-tailed eagle nests are known from the area, including a record 1 km north of Tarraleah tunnel in June 2022. Wedge-tailed eagle nests have been recorded along one short span of the proposed new transmission line. Grey goshawk, swift parrot, masked owls and eastern quolls recorded in the area.	Retention of trees is important for raptor nests and habitat and is also important for screening the redevelopment to maintain as many natural views as possible.

Table 4.1 Biophysical factors influencing the visual setting of the redevelopment. (Sources: Bureau of Meteorology; Land Information System Tasmania, Natural Values Atlas) (*continued from previous pages*).

In addition to the macro controls on the setting, the area is influenced by striking ephemeral conditions that add atmosphere to the experience of the landscape including:

- occasional snowfalls throughout the year;
- changing lighting through the day;
- side lighting during parts of the day emphasising the three-dimensional form and mass of the landscape features; and
- patterns of cloud and fog.

Timber harvesting and bushfire are a threat to the integrity of the visual landscape. Permanent Timber Production Zones cover much of the study area, including Butlers Gorge Road and the area north of Mossy Marsh and Tarraleah. Views to hydropower infrastructure need to be obscured by vegetation screening wherever possible,

particularly from the Lyell Highway, where most of the traffic is concentrated, and from the TWWHA.

Bushfire is common in the Tasmanian landscape as a natural occurrence, as a purposeful management tool or because of human sources such as sparks from machinery, downed powerlines, or arson. Fire is known to have been used as a management tool by Aboriginal people to create a landscape conducive to their needs. In more recent times, fire has been used as a tool in the regeneration of harvested forests, to promote ecosystem diversity and to reduce fuel loads. Predicted climate change suggests that more frequent and more intense fires will occur[13].

Whatever the source, bushfire has the potential to have significant impacts on the landscape with long term effects including the loss of screening provided by existing vegetation. Depending on the nature of the fire, the regenerating vegetation may be different and could change the screening potential.

4.1.2 Social and cultural matters

Aboriginal Heritage

Traditional travel routes north from Lake St Clair past Cradle Mountain connected the people of the Big River Nation to the lands of the North Tribe giving convenient access to the Surrey Hills plains, Mt Housetop and the western end of the Norfolk Range Road to the west coast[14].

Tracks were likely maintained by burning. Burning by Aboriginal people would have maintained a mosaic pattern of vegetation that supported a range of foodstuffs. With the elimination of their burning practices, areas of the landscape are believed to have reverted to rainforest vegetation.

Local place names reference Aboriginal occupation of the area such as 'tarraleah' which is the Lairmairrener Aboriginal word for 'forester kangaroo'. Other known place names include leeawuleena ('Lake St Clair') and Wayatinah meaning 'brook'.

Settlement patterns

The nearest settlements to the proposed redevelopment are Ouse 37km to the south (population 326)[15] and Derwent Bridge 54km via Lyell Highway to the north (population

13 Abram, N. J., Henley, B. J., Sen Gupta, A., Lippmann, T. J., Clarke, H., Dowdy, A. J., ... & Boer, M. M. (2021). Connections of climate change and variability to large and extreme forest fires in southeast Australia. Communications Earth & Environment, 2(1), 1-17.
14 Ryan, L. 1996 (2nd ed.). The Aboriginal Tasmanians Allen and Unwin St Leonards, NSW. Pgs 24 and 27.
15 https://abs.gov.au/census/find-census-data/quickstats/2021/SAL60484 Accessed 01.07.2024

40)[16]. Tarraleah village which is immediately adjacent to the power station is a former Hydro village now in private ownership and currently provides tourist accommodation.

A very limited number of scattered rural residences are located within the vicinity of the redevelopment sites.

Smaller settlements (<20 residential buildings including both temporary and permanent residences) occur around several hydro impoundments located within 5 to 10km of the redevelopment infrastructure. These include settlements at Dee Lagoon, Bronte Lagoon, Lake Samuel and Highland Waters. Bradys Lake located approximately 8km from Tarraleah village, is a recognised hydro impoundment and has a population of 42 permanent residents (ABS Census, 2021).

Sense of place values

Sense of place values are influenced by a variety of factors:

- how elements within the landscape become a reference for people's experience of a place and how these make the landscape legible to them[17];
- the beauty of a place (i.e. scenic quality);
- how the landscape tells the story of the history of a place (i.e. cultural landscape values);
- the experience of the place as a person moves through it; and
- the symbolic and spiritual qualities ascribed to a place.

Individuals instinctively ascribe weight to these aspects of the landscape as part of their life world. As a community, the significance of sense of place values intensifies as perceptions are shared and become part of a common bond, that is, how these values become self-defining to a community and their attachment to the uniqueness of living in a place – attachments strengthened through familiarity, access, knowledge of and cultural engagement with a locale.

Anecdotally and without further and in-depth community engagement, it can only be assumed that the sense of place values around the redevelopment will vary in depth with individuals. Those with the strongest attachments to the place are likely people

16 https://abs.gov.au/census/find-census-data/quickstats/2021/SAL60151 Accessed 01.07.2024
17 See Lynch, K. 1960. The Image of the City MIT Press, Cambridge, Mass.

associated with the original hydro developments and their on-going maintenance and more latterly with fisherfolk who use the lakes and rivers nearby.

To the extent possible, sense of place values has been considered in evaluating the potential visual impacts arising from the redevelopment (see Section 5.1.7).

Tourism and recreation

Natural outdoor attractions, particularly Lake St Clair are a major drawcard for the area with outdoor and adventure activities as a strength of the area, Derwent Bridge drawing 169,000 visitors in 2022 and Queenstown to the west, 160,000[18].

Outdoor, other activities, bushwalking including visits to national parks, bushwalking less than 4 hours and visiting historic sites account for the highest proportion of activities undertaken by holiday visitors in Tasmania including Derwent Bridge and Lake St Clair.

Visual impacts, where they are significant, are likely to affect the visitor experience of the region. Promotion by various tourism bodies welcoming people to our 'natural state' would likely create an expectation by visitors of limited visual intrusion into a natural setting.

The highest number of visitors to the area would arrive via the Lyell Highway (A10). A permanent traffic counter in Derwent Bridge, at the turnoff to Lake St Clair Road, east of Lake St. Clair indicates 780 AADT (Average Annual Daily Traffic) in 2022 of which 9.7% were trucks in 2021[19]. A counter west of that same intersection recorded only 300 vehicles AADT in 2022, of which 11.1% were trucks in 2021.

A counter on the highway just south of the junction with Butlers Gorge Road recorded 322 vehicles AADT in 2021 of which 11.7% were trucks in 2021.

Fourteen Mile Road (C601) provides a short cut that avoids the Tarraleah power station and Tarraleah. Vehicle counters on the Lyell Highway west of the intersection with Fourteen Mile Road recorded 550 vehicles AADT in 2022, of which 11.4% were trucks in 2021. Fourteen Mile Road itself is unsealed and receives limited use. Even fewer vehicles would use Butlers Gorge Road (C603) as it is a dead end and is also unsealed.

Recreational uses in the area include: fishing, camping, bushwalking and picnicking.

18 http://www.tvsanalyser.com.au/ Accessed 01.07.2024.
19 Tasmania Department of State Growth (2024). https://tasmaniatrafficdata.drakewell.com/publicmultinodemap.asp Accessed 01.07.2024

Lake King William is managed as a Premium Wild Trout Fishery and is open all year to anglers. Lake access is via the boat ramp at Butlers Gorge. Boats also launch at the north end of the lake accessible from the Lyell Highway.

There is a very basic camping area adjacent to the Clarke Dam at Butlers Gorge. The campground has no facilities. The campground is principally used by anglers. Campgrounds and fishing are also available at Bradys Lake, Lake Binney and Tungatinah Lagoon which are recognised hydro impoundments.

The TWWHA is a popular bushwalking area. Amongst the tracks in the TWWHA with the potential to see parts of the redevelopment are:

Gingerbread Track, an alternative route for walking to Mount Rufus;

Mount King William I, 11 km to the west, is a known bushwalking destination within the TWWHA but is not strongly promoted as a destination. No formal counts are made on this track but registrations in the Parks and Wildlife Service logbook suggest approximately 180 walkers fill in the book per annum.

Further afield (> 21 kms), the Mount Rufus walk attracted just over 3000 walkers between January and September 2022. Mount Rufus is a well know and promoted day walk.

Wylds Craig is a remote, less well-known destination 19km south of the redevelopment.

Frenchmans Cap is at the edge of the modelled area at 24.5km distant from the proposed changes. Frenchmans Cap is one of the more popular of Tasmania's challenging, multi-day walks with around 2,000 walkers using the track in 2023-24[20].

The old gold miner track off Jane River is used to access Mount Emma, Erebus and Dalys Rivulets but is not well known[21]. Similarly, the Linda Track is one of many lesser-known tracks that come off the Lyell Highway.

The Clarence Lagoon is a 450m walk from a 4WD track that comes off the Lyell Highway. It is used by anglers wanting to fish in the lagoon.

20 Parks and Wildlife Service (2024), Tourism, Experience and Visitor Services | Tourism Projects and Programs, 01.10.2024
21 Tastracks (2013) Tracks off the Lyell Highway. https://tastracks.webs.com/lyellhighway.htm#633420330 Viewed 7 March, 2023

A small picnic area with a public toilet and barbeques is maintained where the Lyell Highway crossed the Nive River adjacent to the switchyard.

Land use – reserved lands, agriculture, forestry and hydroelectricity

Map 4.1 showing land tenure illustrates how the redevelopment traverses ~16 km from the intake to the power station, in broadly linear manner, including across;

- Hydro owned land at the headrace pipeline and tunnel portal connected to Lake King William intake and at the power station;
- Permanent Timber Production (transmission line, pipeline and tunnel, and mid access tunnel);
- the Tarraleah Conservation Area including works at No. 02 Pond, the surge access portal and proposed spoil emplacement areas; and
- underground below private land from the Conservation Area to the power station.

The layout of the northern transmission line option is not included in Map 4.1. This transmission line option will extend northeast from Tarraleah to connect with the existing Liapootah to Palmerston transmission line and is situated entirely on Crown land zoned for 'Permanent Timber Production' and managed by Sustainable Timber Tasmania.

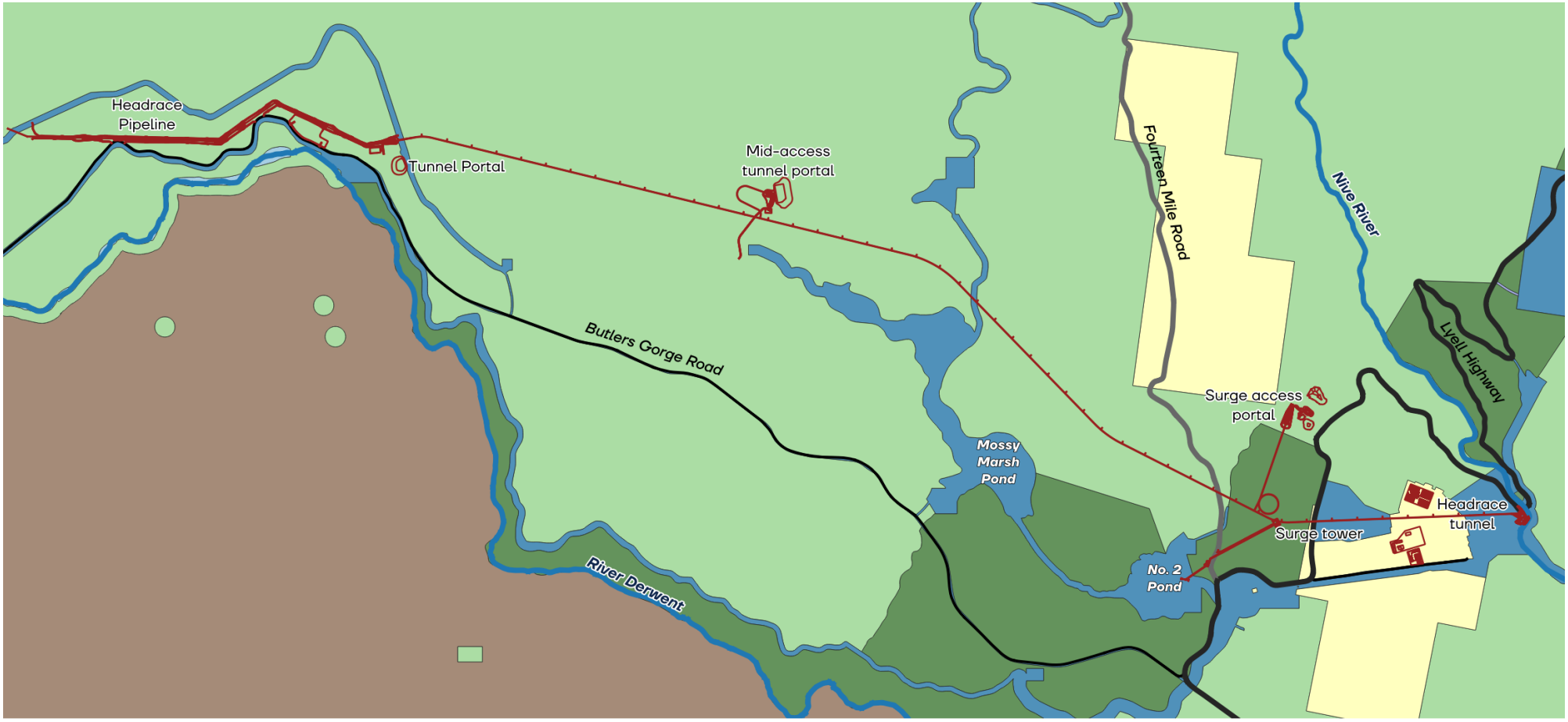
Forestry has a long history in the area. Plantation forests are managed on a rotation basis that creates a mosaic pattern of ages between cleared and re-established coupes. Sustainable Timber Tasmania manages its native eucalypt forests on a 90-year timeframe that allows for at least three rotations for eucalypt sawlog production (i.e. 30 years)[22].

The colouration (particularly juvenile aged trees) and linear planting of coupes is evident because of their contrast with the darker coloured, more irregularly spaced adjacent native forests. Intact native forests are a mosaic of randomly distributed trees and plants of varying colour that reflect the evolution of the vegetation communities and influence of the underlying geology and landform, aspect and fire history, amongst other things, on plant diversity, stature and vigour.

22 Forestry Tasmania 2016. Forest Management Plan Forestry Tasmania, Hobart. Pg. 17

Harvesting of coupes can lead to exposure of currently screened elements to viewing and alternatively the growth of new vegetation may lead to screening of elements that would at first be exposed to the view. By contrast, the screening provided by remnant forests protected within reserves, is likely to be retained over a relatively long-time scale in the absence of catastrophic loss due to fire or other impacts.

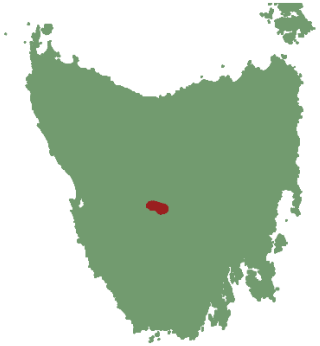
There is already substantial hydroelectricity generation and transmission infrastructure associated with the redevelopment including dams, water conveyance systems, substations and switchyards and high and low voltage transmission lines. Existing high voltage transmission line corridors thread through the project area (Butlers Gorge-Lake St Clair 110 kva and the Tungatina-Butlers Gorge 110 kva tee). Multiple transmission lines emanate from the power station and run east to New Norfolk and northwest to Waddamana.



Map 4.1 Land Tenure

- Private Freehold
- Public Reserve
- National Park
- Permanent Timber Production Zone Land
- Conservation Area
- Conservation Covenant
- Hydro-Electric Corporation
- Inland Water
- Casement

- Tarraleah Redevelopment
- National/State Highway
- Collector Road
- Local Road



0 1 2 km

Prepared using theLIST ©State of Tasmania

Map 4.1 Land tenure

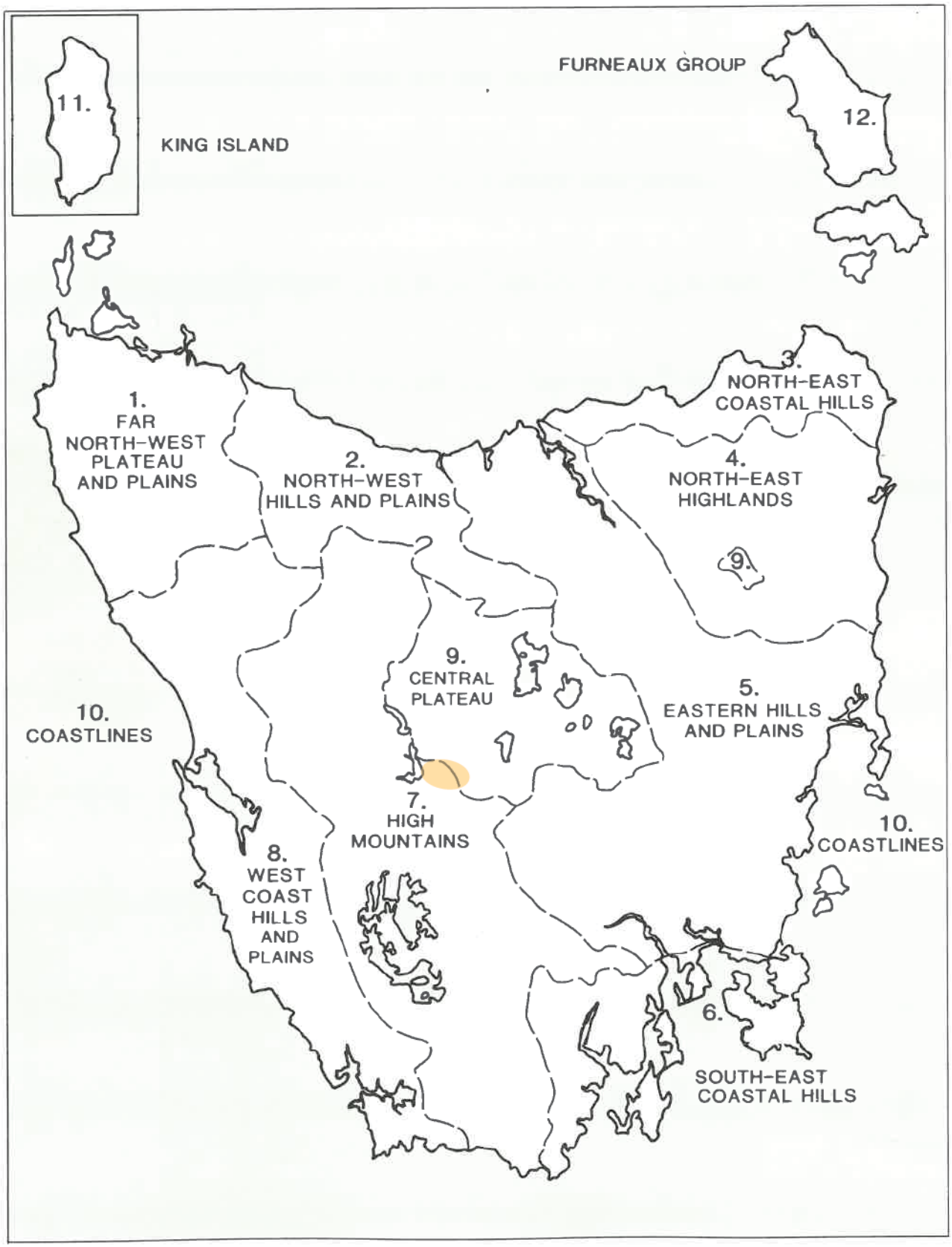
4.2 Landscape character

4.2.1 Landscape character type

Landscape character types (LCTs) are physiographic regions with common distinguishing visual characteristics of landform, waterform, vegetation and cultural influences[23]. It is generally agreed there are 11 regional landscape character types in Tasmania (Map 4.2). Tarraleah falls in the very northern edge of the High Mountains Landscape type that borders the Central Plateau type. Hydro-electric development is a characteristic element within both LCTs and includes features of the redevelopment such as the power station, surge tower, penstocks, canals, transmission lines, intakes, tunnels, spoil emplacement areas, etc.

For the purposes of this report, the High Mountains LCT (Attachment C) has been used because the boundaries between these large units were not intended to be interpreted as precise and the redevelopment site has a more mountainous character than the plateau area.

23 Op.cit. Forestry Commission Tasmania c1990. p 49.



Map 4.2 Landscape character types (Source: Forestry Commission 1990)

4.2.2 Scenic quality

A frame of reference has been developed for the High Mountains Landscape Character Type that enables the aspects of scenic quality to be assessed into classifications of high, moderate and low based on the attributes of the type area (Attachment B). High scenic quality in the High Mountains LCT is associated with: dramatic landforms and escarpments, strong patterns of vegetation and strong water elements.

Evaluation of the setting of the redevelopment against the criteria of the frame of reference for the High Mountains LCT indicates the **moderate scenic quality** of its landscape because the location lacks strong contrasts. The landforms in the area are generally rounded and regular with moderate slopes. There are many streams in the area that add to the landscape character at a moderate level.

The vegetation varies moderately in texture. There are areas of buttongrass that are broken up by tall shrubs and low forest as well as forested areas, particularly along the Lyell Highway. While varying in texture, the area generally lacks the strongly defined patterns and dramatic displays of form, colour or texture that would give the area higher scenic quality.

Nonetheless, there are elements in the immediate area of the redevelopment that would be assessed as having high scenic quality including;

- the King William Range (as a backdrop to Lake King William) and the Nive River Gorge around the power station;
- the River Derwent and the Nive River and its strongly incised valley in the vicinity of the power station; and
- Lake King William.

In other regions of Tasmania, landscape character sub-types have been described to demarcate units that share many of the common landscape features of the landscape character type but have distinctive common environmental and cultural influences that can be readily identified. The identification of a landscape character sub-type was not necessary as the larger landscape character type description was sufficient for evaluation of the redevelopment.

4.2.3 Scenic interest

To understand the potential impact of the proposed changes on the existing landscape, the aspects of the redevelopment that may lend positive character to the landscape

need to be considered. These qualities are considered as scenic interest as distinct from scenic quality. Measuring and ascribing value to scenic interest attempts to account for the fact industrial infrastructure may have value in the visual landscape for the fascination found in its built form or the visible expressions of its workings.

In response to these factors, a scenic frame of reference for rating scenic interest was previously developed[24] and later refined in other Tasmanian studies[25] (Attachment C). While scenic interest does not necessarily mitigate negative visual impacts, it does potentially add a point(s) of interest to the landscape setting that contributes to the acceptability of an impact(s).

Interrogation of the frame of reference for scenic interest indicates that the existing infrastructure has **high scenic interest** depending on the viewer's expectations. People who are visiting with an interest in cultural heritage, local history or hydropower are likely to find scenic interest in the existing and proposed built forms.

The existing Tarraleah power station holds high scenic interest for its architectural merit as a building in the art deco style and has been considered "one of the most architecturally impressive and well designed in the hydro system ... as part of ... the most impressive and significant group of hydro assets in Tasmania" [26]. The Tarraleah hydro-electric development is also recognised for its engineering merit having received a Historic Engineering Marker from Engineers Australia as part of its Engineering Heritage Recognition Program.

The penstocks and surge tower and other elements including canals and aqueducts, for instance, could also be argued to be of high scenic interest for their prominence, dramatic form and high contrast with the surrounding landscape (Photograph 1). The Conservation Management Plan for the power station noted the existing penstocks and surge towers as having high heritage significance for their influence on the setting[27].

The proposed redevelopment will generally have low scenic interest in contrast to the existing works. For instance, the proposed pipelines, power lines and spoil emplacement areas lack the built form or the intrinsic heritage interest that the existing infrastructure of the area holds. The new surge tower, however, may hold some scenic interest due to

24 Jerry de Gryse Pty Ltd 1994. "Bell Bay Major Industry Zone: Visual Values Assessment and Management" unpublished report to the Bell Bay Major Industry Zone Steering Committee
25 Inspiring Place 2001. "North West Industrial Area Visual Aesthetics Assessment" unpublished report to Thompson Brett Engineers and Inspiring Place 2000. 'Musselroe Wind Farm and Associated Transmission Line Visual Values Inventory and Impact Assessment" unpublished report to Hydro Tasmania and Inspiring Place 2002. "Heemskirk Wind Farm and Associated Transmission Line Visual Values Inventory and Impact Assessment" unpublished report to Hydro Tasmania.
26 Austral Archaeology 2007. "Tarraleah Power Station Conservation Management Plan". Prepared for Hydro Tasmania. Pg 47.
27 Ibid. pgs 42 and 44

its height and location in the landscape in conjunction with the interest generated by the nearby surge towers.

The limited scenic interest of the proposed works has limited or no ability to offset its visual impacts. Indeed, the high scenic interest of the existing developments reinforce the need to minimise the visual impacts of the redevelopment as far as possible[28] to avoid diminishing the scenic interest ascribed to the existing facilities.

28 It should be noted that, as part of the proposed redevelopment, some of the existing hydropower infrastructure elements will be decommissioned, including the power station and the hillside penstocks. Due to their heritage value, however, these elements will not be removed from the landscape.

Photograph 1 Penstocks at Tarraleah provide high scenic interest (Source: Creative Commons[29])

Photograph 2 Historic Tarraleah power station in background with proposed site for new station in the foreground (Source: Inspiring Place)

29 Peripitus, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons

4.3 Sensitivity to change

Visual sensitivity is a gauge of the contribution a landscape makes to the sense of place, and the sensitivity of an area to the alteration of its character.

Most landscapes are viewed from multiple locations, some of which are likely to be more sensitive to alterations to the landscape character. Various factors contribute to the rating of sensitivity including the:

> Viewing distance (foreground, midground, background, far view) (section 4.3.1); and
>
> viewing composition, frequency of viewing from representative viewpoints, duration of viewing, and viewer expectations (Section 4.3.2).

Sensitivity to change is the combination of these factors and is presented in Section 4.4.2. The subjective nature of the viewer's expectations means that there will be a diversity of reactions to the introduction of infrastructure to the landscape. However, the fixed measures of distance and frequency of view help define the likely scope of the impacts.

Distance

The proximity of the viewer to an object affects his or her perception of it – with perception of colour and detail diminishing proportionately with distance. At a far distance, colours mute and textures become less obvious. When close up, greater detail is visible and objects occupy a greater portion of an observer's field of vision and, therefore, potentially have a greater visual impact.

Viewing distances are described as foreground (<1 kilometre), middleground (1-5 kilometres) and background (5-20 kilometres), and far view (>20 kilometres). Detail, colour and texture are strongest in the foreground. The middleground is the most visually critical of the landscape where alterations are typically seen in their fullness with sharp edges and colour clearly visible. In the background the emphasis is on the outline or edge of features as colour and texture are indiscernible. In the far view line and shape dominate as colour and texture become indistinguishable.

Viewing composition

viewing composition describes the general features of a viewpoint, including:

> how are the redevelopment elements seen in the landscape – i.e. is the view part of a wider panorama or is it more focused on a particular part of the landscape;
>
> the condition of the setting for the viewpoint – i.e. are the surrounds of the viewpoint attractive or degraded; and
>
> from where the elements are being seen – i.e. is the viewpoint from a fixed position such as a lookout or from a track or moving vehicle.

The position of the viewer is also important. The field of view from a moving vehicle narrows as speed increases. Similarly, as speed increases the duration of viewing lessens. Viewers on walking tracks tend to have a focus on what is ahead, therefore, oblique views to an alteration have less impact than views which are immediately ahead, or views had when resting or at lookout points.

The condition of the viewpoint of the alteration also affect perception of the impact of a change in scenery. Viewers are more accepting of change in an already altered or degraded landscape, as opposed to alterations that affect apparently natural ones where there is high scenic quality.

Frequency (Number of Viewers)

Sensitivity is also affected by the number of viewers, high sensitivity being proportional to how many people actually visit a location where views might be had. Sensitive viewing areas/points with views to the proposed infrastructure were identified using categories of viewing locations developed for use in visual impact analysis[30].

'Seen view' maps (see Maps 4.4 and 4.5) indicate some areas in the TWWHA, particularly to the south of the redevelopment, would see several elements of the redevelopment (in the absence of vegetation) were someone present to take in the view. The reality is there is little likelihood that many of those locations would be visited. For instance, viewshed maps indicate that some elements of the redevelopment are theoretically visible from certain locations on Mt King William II and III, Mt Hobhouse, Mt Shakespeare, and Majors Lookout, which are situated within the TWWHA to the south of the proposed infrastructure. These locations are not currently accessible by marked

30 Forestry Tasmania have categorized the sensitivity of varying types of viewpoints based on viewer numbers and their likely level of concern about changes in the landscape setting. A more refined version of the Forestry table first applied in Victoria's forests in the late 1970s and used herein analyses similar variables but draws a distinction between sensitivity arising from simple numbers of viewers (who may only have moderate or little concerns about change) compared with those where there is less frequent viewing but a clearly higher concern about change (say for instance from a remote walking track of national significance) (Attachment C).

tracks or paths. These peaks do however feature on the 'The Abels' list (website and book) and are known destination for 'peak-bagger' and the more experienced bushwalking fraternity. The 'Peakbagger.com' Website provides data on 'logged' visitation and popularity rankings on The Abels and HBWC Lists. Table 4.2 summarises that data, showing very low annual visitation rates.

Table 4.2 summary of data from peakbagger website (https://www.peakbagger.com); accessed 10/10/25

Peak	The Abels List Rank	HBWC Rank	Attempts Logged (in period, years)
Mt Hobhouse	96	137	27 (2018-2025)
Mt King William I	62	86	98 (1977-2025)
Mt King William II	53	68	21 (1983-2025)
Mt King William III	-	159	7 (2000-2025)
Mt Shakespeare	97	138	40 (2011-2025)

Low number of viewers accessing sites in the area can also be inferred from traffic counts. Estimates of views from roads are based on average annual daily traffic (AADT) recorded for roads within the area with permanent counters installed by the Department of State Growth[31]. Their counts show that in 2023 the AADT for Lyell Highway:

> nearing Tarraleah village from the south was approximately 600;
>
> to the north of Tarraleah village, travelling past Bradys Lake and Lake Binney, near the turn off to Malborough Road was approximately 540;
>
> and near the intersection past the turn off to Fourteen Mile Road, was approximately 540.

31 Department of State Growth (2024) https://tasmaniatrafficdata.drakewell.com/publicmultinodemap.asp accessed 29.08.2024

Extent of visitation to the area, including to regions within the TWWHA is further discussed in section 4.1.2.

Duration

Duration or length of viewing time strongly influences a viewer's capacity to perceive change. Permanent views or those of lengthy duration have a lower capacity to absorb change than those that appear as only fleeting glimpses. With increased opportunity to observe change comes a heightened awareness of the presence of a feature in the landscape and perception of its detail.

Visitors at a lookout for instance, tend to have longer time to take in their landscape surrounds. After a time, they recognise not only the major features in the scene but also more subtle elements in the view and elements that contrast with their surrounds. Longer views are also typically had from residential areas (such as Tarraleah), stopping points, and recreational areas.

Butlers Gorge Road and Lyell Highway come into close proximity of the redevelopment which also lengthens viewing duration of travellers. Views from the road vary with speed as does the breadth of the field of view. At higher speeds, the angle of viewing narrows and less is seen. The alignment of the road is also a factor in viewing duration, long straight sections of roads, particularly those with focal views to a development allow for greater opportunity to take in the view and the elements within it.

Viewer Expectations

A viewer's life experiences and expectations affect how changes in the landscape are evaluated and how they are personally affected by alterations in the landscape. Tourists to the State likely hold images in their minds as to what they will see based on promotional materials designed to brand Tasmania as a 'clean and green... natural state'. To these visitors a hydroelectric development may reinforce their believe in sustainable energy production, or it may sit in contrast to their expectation or a natural landscape setting.

Visitors with experience of hydroelectric generation in Tasmania and elsewhere in Australia may see the redevelopment as an increasing part of regional economies and as a fact of modern life and therefore may be more accepting of any visual impact. As previously discussed (Section 4.1.2) hydroelectric generation is a part of the history of Tarraleah and visitors and tourists with knowledge and experience of this history may consider continued development as part of the regions sociocultural landscape.

Some psychological mitigation of negative perceptions of change may also result from the sequence in which a view is revealed to a particular audience. Bushwalkers heading

into the TWWHA's wilderness setting would expect an apparently natural[32] or biophysically natural landscape and be aware of even minor alterations with the setting. This contrasts with the expectation of that same group when walking out of such a setting and returning to civilization. In the latter case, the expectation would be that alterations to the natural character may be visible, more frequent and/or of larger scale on approaching settlement and thus their concern about changes to the view may be lessened – an assumption applied and accepted in recent evaluations of visual impacts on facilities in the Wilderness World Heritage Area[33] and applicable to the experience of many of the walking tracks with views to the redevelopment.

4.3.1 Seen view analysis

'Seen view' or 'viewshed analysis' can be used to predict the theoretical seen view from any point. GIS mapping was used to identify areas from which defined points on the redevelopment could be seen[34].

Two modelling techniques (Attachment A) have been used to calculate the visibility of the redevelopment a:

> Digital elevation model (DEM) - based on the line of sight available based on the terrain only, that is, it assumes the absence of vegetation[35]; and
>
> Digital surface model (DSM) – which accounts for the presence of vegetation in its interpretation of visibility.

To undertake the seen view analysis an array of 500 'observation points' were placed across all the proposed infrastructure (Map 4.3). Total seen view maps (Map 4.4 – 4.5)

32 The term "apparently natural" denotes those landscape that have a feeling of naturalness which may be apart from their actual origins. That is, apparently natural landscapes may evoke a sense of naturalness or appear to be natural to the untrained eye (I.e. shaped by natural or cultural forces over a long period of time), where they may in fact be landscapes that have been significantly modified by recent human activity (say forestry operations) or destructive wildfire. Apparently natural landscapes may have high scenic value. Use of the term, frees the assessor from having to make a judgement about the origins of the setting and allows for aesthetic evaluation of the elements and design principles discussed in Section 2. Nonetheless, a landscape that has evolved over a long period may be understood to have a higher aesthetic value than an apparently natural one based on a viewer's evocative response (reverence, joy, delight) or the cognitive meanings they ascribe to it (sense of depth of time, connectedness, natural cycles). Note: The concept of apparent naturalness was introduced in relation to aesthetics in Tasmania in Jerry de Gryse Pty Ltd 1991. "Aesthetic Value Assessment: Extension Areas to the Western Tasmanian National Estate Interim Listing" unpublished report to the Australian Heritage Commission. The definition above is a more recent refinement intended to reflect current understandings about the use of cultural practices, including the use of fire, by Aboriginal communities to create the characteristic landscapes of Tasmania. See Gammage,B. 2011. The Biggest Estate on Earth: How Aborigines Made Australia Allen and Unwin.
33 Inspiring Place 2018. "Dove Lake Visitor Facilities Visual and Wilderness Values Impact Assessment" unpublished report to the Tasmanian Parks and Wildlife Service.
34 Note in the GIS analysis, a point represents a grid cell or pixel of a defined size. Both modelling techniques used in the current study uses a 5 by 5m grid cell. Thus, in the visibility analysis the 'viewpoint' could be anywhere within 25 square meters. The use of a 5m resolution means that the screening value of elements less than 5m in height (i.e. landforms, vegetation, buildings) are not accounted for in the analysis of the frequency of views. Total viewing numbers in the following discussion should therefore be read with consideration of the limitations in the data, the outcome of which presents an over-conservative estimate of what will be seen.
35 Examination of the view without vegetation is the commonly adopted technique used by visual management professionals as it accounts for the loss of vegetation say from fire, senescence, clearing, disease, etc. For instance, Forestry Commission 1990. op.cit. pg 113 indicates that screening provided by vegetation is potentially temporary. A more realistic understanding of the situation is obtained in the field where vegetation can be accounted for (the DSM model). The frequency of viewing illustrated by the DEM model, therefore is the maximum potential for viewing which is a cautionary analysis of the real situation.

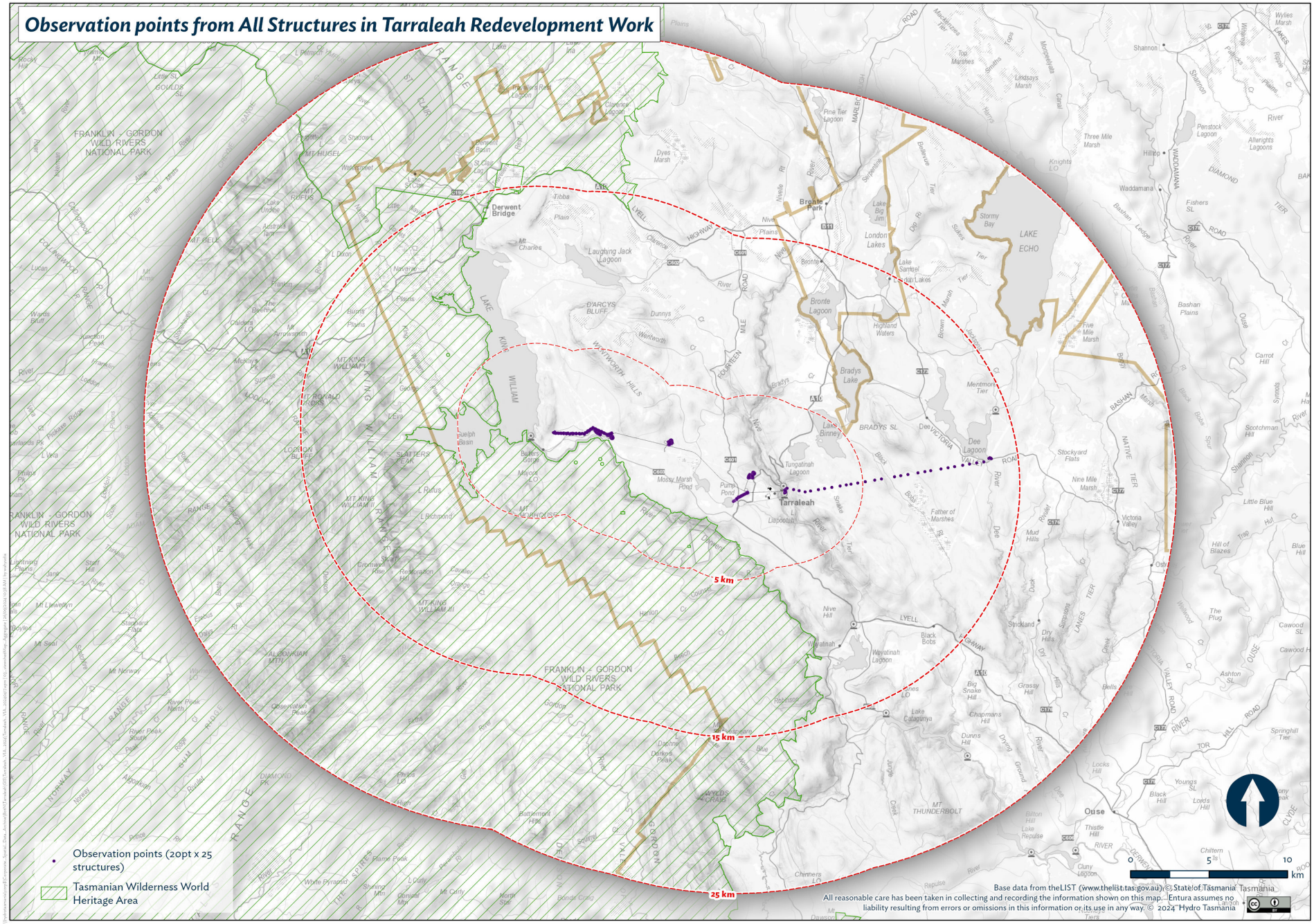
give an indication of the relative visibility of the full redevelopment. Darker colours on Maps 4.4 and 4.5 represent areas which see the highest number of observation points. A seen view analysis of each element of the infrastructure was also undertaken these are discussed in this section and results for the DEM and DSM mapping are shown in Table 4.3 DEM and DSM maps for the assessed elements are provided in Attachment D.

In total, the seen view from 3,229 sensitive viewpoints within 25km of the redevelopment were analysed to understand the number of observation points that would be viewed from each viewpoint. A breakdown of sensitive viewpoints is also shown in Attachment D.

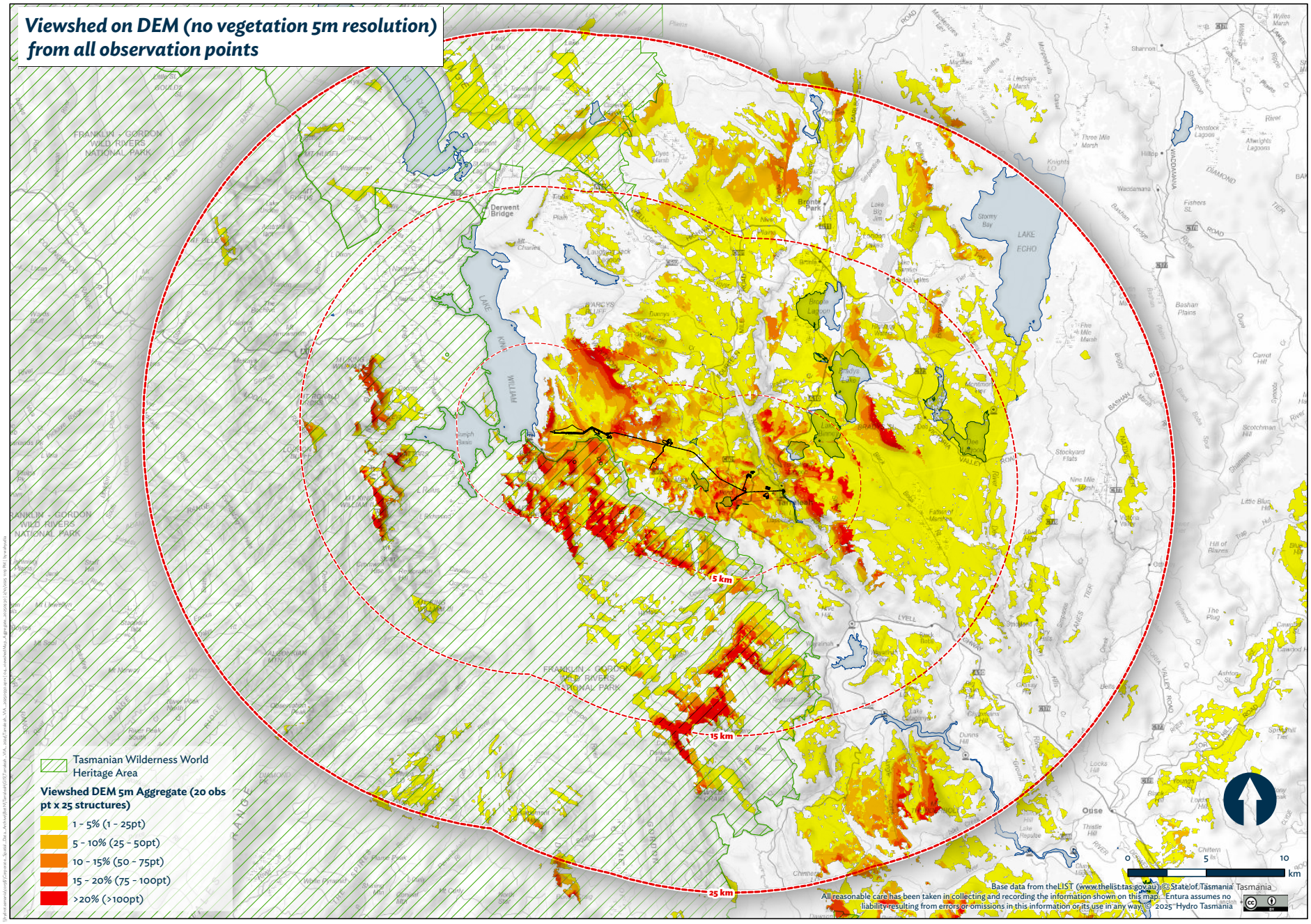
The large geographic spread of the redevelopment means that the analysis of the visibility of the infrastructure needed to be divided into four sections (Map 4.6):

- the headrace tunnel and pipeline infrastructure (i.e. headrace pipeline and western tunnel portal, left and right service roads, construction compound, spoil emplacement area) and the mid access tunnel portal and associated works area and spoil emplacement area located north of Butlers Gorge Road;
- the surge tower and No. 02 Pond pump station and associated infrastructure (i.e. rising main connecting surge tower facility and No. 02 Pond pump station, surge access tunnel portal and three spoil emplacement areas at Paddys Quarry), note that, for brevity, in most cases where only a very limited number of points of the associated infrastructure is seen from a viewpoint, it has not been specifically identified in Table 4.3; and,
- the Tarraleah B power station; and
- the new 220kV transmission line from Tarraleah to Tungatinah (northern transmission line option).

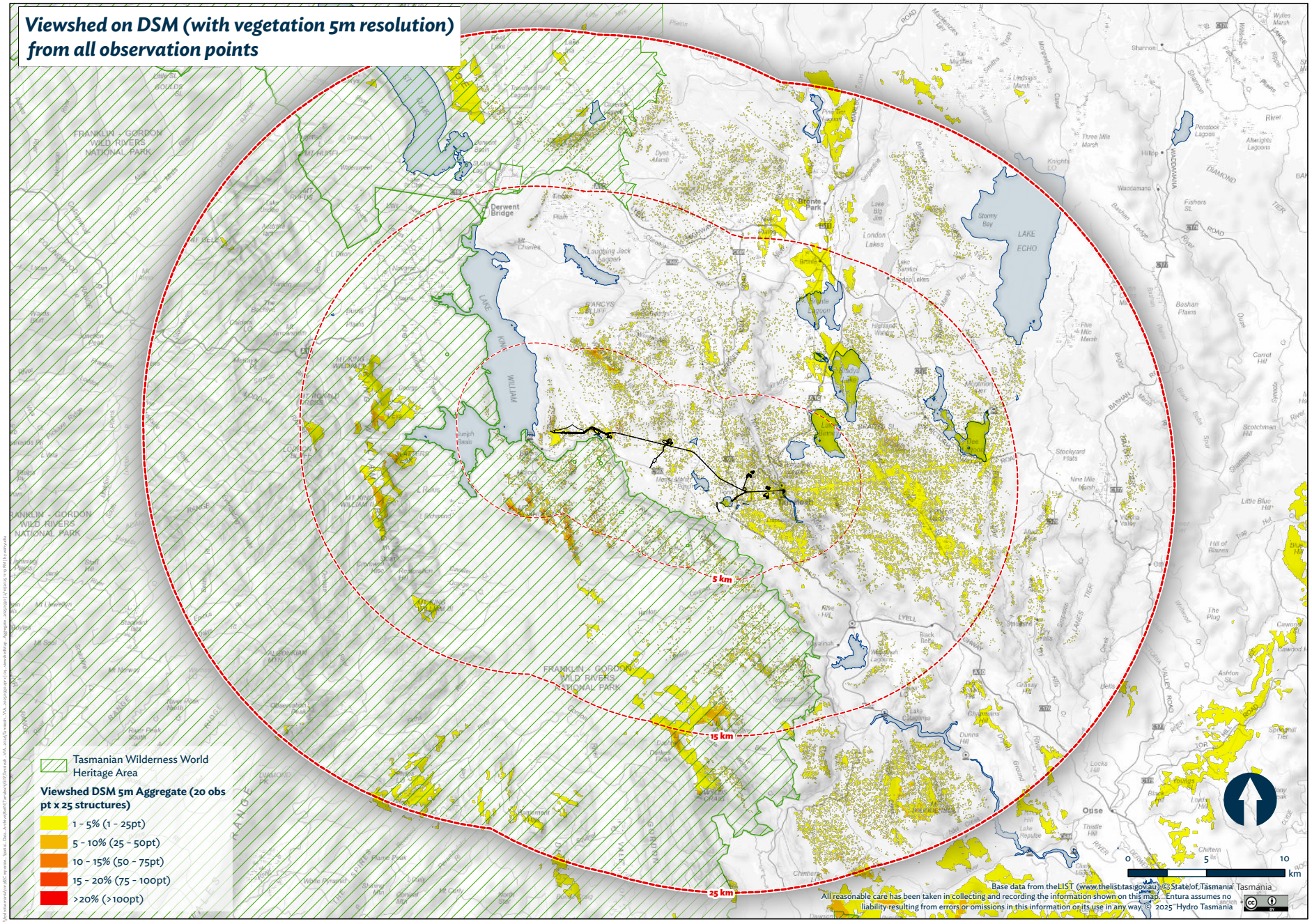
When interpreting Table 4.3, it is important to remember that for any point of interest, whether road, walking track, residence or other viewing location, the total number of points that are being modelled will depend on the location.



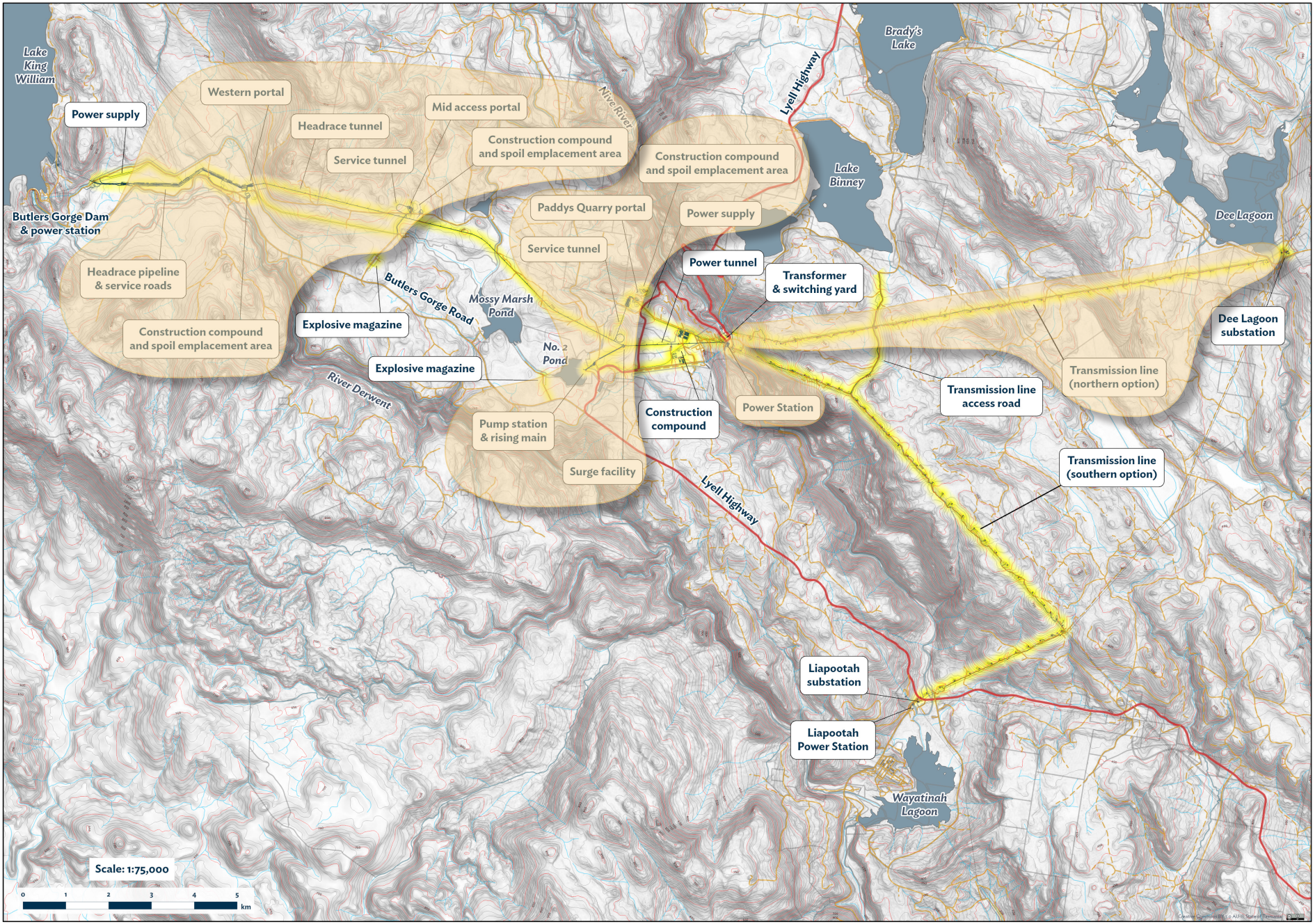
Map 4.3 Tarraleah redevelopment viewshed analysis observation points from visible structures (prepared by Hydro Tasmania). Brown line within map shows available LiDAR extent.



Map 4.4 Digital Elevation Mapping (DEM) of the Tarraleah redevelopment work (Prepared by Hydro Tasmania).



Map 4.5 Digital Surface Mapping (DSM) of the Tarraleah redevelopment work (Prepared by Hydro Tasmania).



Map 4.6 Infrastructure elements of the Tarraleah redevelopment. Theoretical visibility of infrastructure components is analysed as indicated by yellow bubbles (Source: Hydro Tasmania)

Table 4.3 Theoretical visibility of the various components of the **whole redevelopment** from key locations in the absence (DEM) and presence of vegetation (DSM). The total number of points of the DEM and DSM is given to get a sense of the screening capacity of vegetation for each location. **Extent of visibility in the DSM (where visible through vegetation) is written in *italics***. Distance (Km) is measured from the observation point to the nearest component. (*continues following pages*)

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
Public Roads							
Butlers Gorge Road west (from near the Lake King William intake to location of the headrace tunnel spoil emplacement area)	< 1	Up to 69	Up to 12	12 points of possible 20 of headrace tunnel portal, and 13 points of possible 20 of headrace pipeline, as well as 10 points of possible 20 of associated spoil, and 16 of possible 20 of laydown areas. *Up to 5 points of possible 20 of Headrace pipeline visible from a limited number of points along road. less than 2 points of possible 20 of pipeline capping and right and left road visible from these points.*	-	-	-
Butlers Gorge Road mid (from	< 1	Up to 94	0	Up to 15 points of possible 20 of	19 to 20 points of possible 20 of No. 2	-	11 of possible 35 points of transmission line

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
headrace tunnel spoil emplacement area to mid tunnel access)				Headrace pipeline, up to 8 points of possible 20 of tunnel portal and up to 6 of associated spoil area, and 13 points of possible 20 pipeline laydown area.	Pond pump station comes into view as the road parallels mid access tunnel; 20 points of possible 20 points of surge tower, 2 points of possible 20 of surge tower access track, and 13 of possible 20 of earthworks seen as the road runs parallel to the mid access tunnel.		seen when the road is parallel to the mid access tunnel.
Butlers Gorge Road east (from mid access tunnel to exit to Lyell Hwy)	< 1	Up to 104	0	Up to 5 points of possible 20 of mid access tunnel portal, up to 9 points of possible 20 of mid access spoil area, and up to 17 points of possible 20 of mid access tunnel works area seen from several points along this segment of the road.	Up to 19 points of possible 20 of No. 02 Pond pump station from one point on road parallel to the pond); 20 points of possible 20 of surge tower from most points along road segment; glimpses of rising main (up to 2 points of possible 20 from most of this road segment) surge tower access track (up to 10 points of possible 20) and	-	Transmission line visible along the latter half of this road segment (between Mossy Marsh and No.02 Pond pump station, up to 11 of possible 35 points can be seen.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					earthworks (up to 14 points of possible 20).		
Lyell Highway, leading up to No. 02 Pond pump station	< 1	Up to 86	Up to 12	Glimpses of mid access tunnel (up to 5 points of possible 20) and spoil area (up to 10 points of possible 20), up to 13 points of possible 20 of mid access tunnel works area and seen from a few points along this segment of the road.	20 points of possible 20 of No. 02 Pond pump station come into view as the road falls into the immediate vicinity, otherwise unseen from the segment of road coming into Tarraleah from the Wayatinah direction (southeast); Up to 20 points of possible 20 of surge tower from some areas along this route; Surge tower access track (up to 18 points of possible 20) and earthworks (up to 7 points of possible 20) also visible mostly from where the road turns north towards Tarraleah, some limited visibility from points on the road southeast of redevelopment.	-	Up to 8 points of possible 35 points visible at certain points along, approximately 8 kilometres of the route from No. 02 Pond pump.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					12 points of possible 20 of surge tower visible from one point Lyell Highway approximately 8 kilometers from the surge tower.		
Lyell Highway & Fourteen Mile south intersection	< 1	Up to 86	75	-	20 of possible 20 points of No. 02 Pond pump station; 20 points of possible 20 of surge tower; access track (up to 18 points of possible 20 points) and earthworks (up to 7 points of possible 20 points) *Up to 20 points of possible 20 of No.02 Pond pump station, 20 points of possible 20 of surge tower, 13 points of possible 20 of surge tower access track are visible from* one point *at intersection.*	-	Up to 4 points of possible 35 visible.
Lyell Highway in Tarraleah village	< 1	Up to 73	Up to 12	-	Up to 20 points of possible 20 of No. 02 Pond pump station seen from near turn off to Oldina drive; up to 14 of possible 20 points of Paddys Quarry Spoil 3,	-	Up to 7 points of possible 35 points visible along most of this stretch of road, with a few limited points as the road.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					up to 11 points and up to 6 points of possible 20 of spoils 1 and 2, respectively visible from where the road nears the spoil piles; 20 of possible 20 of surge tower from all points, and glimpses of associated infrastructure from some points. *Up to 12 points of possible 20 of surge tower visible along the segment of road between Tarraleah Golf Course and Oldina Drive turnoff.*		
Lyell Highway from Tarraleah Village to Tarraleah B power station	< 1	Up to 39	Up to 8	-	Up to 11 points of possible 20 of Paddys Quarry spoil 1, Up to 6 of spoil 2, and up to 4 points of possible 20 of spoil 3 is visible within the first 1km stretch of this road segment (near to spoil locations); 20 points of possible 20 of surge tower seen from one	Up to 4 points of power station laydown as the road comes within ~120m of laydown. 2 points of possible 20 of station visible from point on road closest to the proposed station.	Not visible from approximately 1km of road after leaving Tarraleah Village. Up to 7 points of possible 35 visible over the remaining route to the power station site. *Not visible in first 1km of the segment, up to 4 points of possible 35*

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					point close to Paddys Quarry spoils;	*5 points of possible 20 of station*[36] *visible from one point on road close to station.*	*visible from limited points along the remaining segment,*
Lyell highway near Tungatinah forest reserve and Lake Binney	1-4	Up to 85	Up to 1	Glimpses of mid access tunnel (up to 4 points of possible 20) spoil area (up to 11 points of possible 20), and works area (up to 15 of possible 20) from short segment approaching Tungatinah Lagoon.	Up to 15 of possible 20 points of Paddys Quarry spoil 3, 8 points of spoil 2, and 9 points of spoil 1 visible from a short segment of road leaving Tungatinah Conservation Area and approaching Tungatinah Lagoon; Up to 20 points of possible 20 of surge tower visible from along route between Tungatinah Conservation area and Lake Binney; up to 6 points of surge tower earthworks and up to 9 points of surge tower tunnel portal also visible.	Up to 6 points of possible 20 of Tarraleah B power station laydown area visible from very short segment near tower location.	Up to 8 points of possible 35 points visible along most of this stretch of road. *Up to 1 points of possible 35 visible from just two points along this segment close to location of Tarraleah B power station.*
Fourteen Mile Road south end	0-8	Up to 43	0	Short glimpse of mid access tunnel portal	Glimpses of Paddys Quarry spoils from a	-	Up to 11 points of possible 35 visible

[36] The viewshed analysis is sensitive to raster cell resolution. In this case, a 5m resolution was used, which may result in some aggregation effects. This was noted on two occasions in relation to Tarraleah B Power Station. Due to these effects, certain observation points have higher ground elevation in the DSM than in the DEM. This can lead to increased visibility from those points in the DSM, especially at closer critical locations such as the picnic area and the Lyell Highway bridge. However, the overall visibility results are still a representative of the terrain as modelled in the DEM and DSM.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
				(up to 1 point of possible 20) and spoil area (up to 3 points of possible 20) seen from where the road passes the infrastructure.	short segment adjacent to dumps (up to 6 points of spoil 1, up to 11 points of spoil 2 and up to 17 of possible 20 of spoil 3); Up to 16 points of possible 20 of surge tower visible from many points along this segment.		along most of this stretch of road.
Harbacks Road	5-9	0	0	-	-	-	-
Lyell Highway near Bradys Lake to Victoria Valley Road intersection	8.5	Up to 35	Up to 4	Glimpses of mid access tunnel (up to 3 points of possible 20), works area (up to 6 of possible 20) and spoil area (up to 14 points of possible 20) from along the northern half of Bradys Lake. *Up to 1 point of possible 20 of mid access tunnel portal visible from road adjacent to Bradys Lake campground.*	12 points of possible 20 of surge tower visible from <u>a short segment towards the northern end of Bradys Lake</u>	-	Up to 7 points of possible 35 visible from road between northern end of Lake Binney and northern end of Bradys Lake *Up to 4 points of possible 35 visible from a short segment of road along northern half of Bradys Lake.*
Laughing Jack Road	9.5	5	0	-	-	-	Up to 5 points of possible 35 visible over the first approx. 4km

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
							stretch from the turn off on Fourteen Mile Road.
Long Spur Road	11	0	0	-	-	-	-
Lyell Highway, north of Lake King William (west of Fourteen Mile Road intersection)	12	Up to 15	0	-	Up to 8 points of possible 20 of surge tower visible from two points on road within approximately 4km of the intersection to Fourteen Mile Road	-	Up to 7 points of possible 35 points visible from a few short segments, primarily from first approx. 4 kilometre stretch of road from Fourteen Mile Road intersection and a few points near to Central Plateau Conservation area.
Victoria Valley Road	13	Up to 12	Up to 1	Very slight glimpse of mid access tunnel spoil area (up to 4 points of possible 20), and works area (up to 1 point of possible 20) theoretically visible from near Lyell Highway intersection.	4 points of possible 20 of surge tower theoretically visible from one point near Lyell Highway intersection.	-	Up to 12 of possible 35 points visible from Victoria Valley Road as it travels around Dee Lagoon and close to Highland Waters lake. *1 of possible 35 points can be seen from a couple of points where the transmission line meets the road at the southern end of Dee Lagoon.*
Fourteen Mile Road north	8 to 16	Up to 16	0	-	Up to 16 points of possible 20 of surge tower visible from most of an approx. 5km	-	Up to 10 points of possible 35 visible along most of the route travelling parallel to

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					stretch of the road travelling west of Wentworth Creek Conservation Area.		Lake Binney and Bradys Lake.
Lake St Clair Road	15	0	0	-	-	-	-
Lyell Highway, inbetween Fourteen Mile Road north and Victoria Valley Road intersections	15.5	Up to 25	Up to 4	-	Limited glimpses of up to 20 points of possible 20 of surge tower visible from approximately 2km on the approach to the Fourteen Mile Road intersection from the east.	-	Up to 6 of possible 35 points of transmission line visible along most of the route. *Up to 4 points of possible 35 points of transmission line still visible from along some of route, particularly closer to Victoria Valley Road intersection.*
Marlborough Road, Bronte Park	16	Up to 5	Up to 3	-	-	-	Up to 5 points of possible 35 visible from a short segment as the road close to Lyell Highway intersection and near Bronte Park *Up to 3 points of possible 35 points of transmission line is visible as above in the presence of vegetation also.*

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
Walking tracks outside the TWWHA							
Tarraleah Falls Trail	< 1	Up to 61	Up to 11	-	20 of possible 20 points of No. 02 Pond pump station visible at the start of the trail; 20 points of possible 20 of surge tower visible along most of the track and, up to 4 points of possible 20 of surge tower earthworks. *11 points of possible 20 of surge tower visible from* one point *at start of trail.*	-	Up to 5 points of possible 35 of transmission line visible from along the first half of the track. *3 points of possible 35 points of transmission line visible from one point located midway along the trail.*
Recorder Track	1.2	Up to 6	Up to 3	-	-	-	Up to 6 of possible 35 points of transmission line visible from most of the track. *In the presence of vegetation up to 3 points still visible from most of track.*
Bradys Lake	6	Up to 18	Up to 12	-	16 of possible 20 points of surge tower theoretically visible from a few points along	-	Up to 2 of possible 35 points of transmission line visible along half of the track towards the centre.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					track segment to the east of Bradys Lake. *Up to 10 points of possible 20 of surge tower visible from one point at the start of the track.*		*Up to 2 points of possible 35 visible from a few points towards the end of the track.*
Dee Lagoon Walking Track	10.2	Up to 10	Up to 7	-	-	-	Up to 10 of possible 35 points of transmission line visible on most of the track. *Up to 7 of possible 35 points from a handful of points along track.*
Walking tracks inside the TWWHA							
Heals Spur, near Wayatinah Lagoon	10.5	0	0	-	-	-	-
Lake Rufus route	7.5	0	0	-	-	-	-
Mount King William I	11	Up to 93	Up to 25	-	Up to 20 points of possible 20 of No. 02 Pond pump station and surge tower, up to 7 points of possible 20 of surge tower access track, up to 13 of possible 20 of surge tower earthworks, up to 16 points of possible 20 of suction main visible from the last 1	-	Up to 17 of possible 35 points of transmission line visible from the final 1km segment of the track. *Up to 13 points of possible 35 of transmission line still visible from along this segment of the track.*

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					kilometre stretch of the track including from the summit. *Up to 12 of possible 20 points of surge tower still visible from along this segment of the track*		
Linda Track	15	0	0	-	-	-	-
Gingerbread Track lower section	16.2	0	0	-	-	-	-
Gingerbread Track upper section	17	0	0			-	-
Lake Dixon/ Lake Undine	17.3	0	0	-	-	-	-
Lake St Clair tracks (incl. Cuvier Valley, Frankland Beaches Walk, Platypus Bay Track)	18	0	0	-	-	-	-
Wylds Craig, Franklin-Gordan Wild Rivers National Park	19	Up to 90	30	Up to 4 points of possible 20 of headrace pipeline, 9 points of possible 20 of tunnel, and 9 points of possible 20 of spoil area, visible from most of the trail. Up to 7 of possible 20 of mid access tunnel	-	-	Up to 25 of possible 35 points visible along most of the track. *Up to 21 of possible 35 points of transmission line remains visible along the trail.*

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
				portal, up to 10 points of possible 20 of mid access spoil area, and 20 points of works area, visible from most of the trail. *Glimpses of mid access tunnel portal access (up to 2 points of possible 20) and spoil area (up to 6 points of possible 20), and mid access works area (up to 1 point of possible 20) from along the final 800m segment of the track.*			
Jane River	19.5	0	0	-	-	-	-
Mount Rufus tracks	20	Up to 4	0	Up to 3 points of possible 20 of headrace pipeline spoil, and up to 1 point of possible 20 of left road visible from an approximate 800m segment of track around 5km from start at Lake St Clair.	-	-	-
Clarence Lagoon	20	Up to 28	Up to 6	-	16 of a possible 20 of surge tower from along	-	Up to 12 of possible 35 points of transmission

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
					the first half of the track. *Up to 4 points of possible 20 of surge tower visible from one point approximately 100 meters from start of track.*		line from along first half of track. *Up to 2 points of possible 35 points of transmission line visible from one point approx. 100 meters from start of track.*
Shadow Lake track	20.3	0	0	-	-	-	-
Franklin River Nature Trail	21	0	0	-	-	-	-
Little Hugel Track	22.5	Up to 13	0	Up to 10 of possible 20 points of headrace spoil area, up to 2 points of possible 20 of headrace access tunnel portal, and up to one point on headrace pipeline left road visible towards the end of the track when approaching the summit but not visible from summit.	-	-	-
Observation Peak to Diamond Peak route (Prince of Wales Range)	23.3	Up to 3	Up to 3	-	-	-	Up to 3 points of possible 35 visible from limited segments along track.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
							Visibility remains as in the absence of vegetation.
Frenchmans Cap	24.5	0	0	-	-	-	-
Points of Interest							
Tarraleah Golf Course	< 1	67	13	-	20 points of possible 20 of surge tower and 1 points of possible 20 on surge tower earthworks visible; 20 of possible 20 of No. 02 Pond pump. *13 points of possible 20 of surge tower visible from Golf Course.*	-	Up to 6 of possible 35 points of transmission line visible.
Tarraleah Lodge, and Cottages at Tarraleah	<1	Up to 67	16	-	20 points of possible 20 of No 02 Pond pump station; 20 points of possible of surge tower, and 4 points of possible 20 of earthworks; *Up to 13 points of possible 20 of surge tower.*	-	Up to 4 of possible 35 points of transmission line. *Up to 4 points of possible 35 points visible.*

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
Tarraleah Lookout	<1	28	13	-	-	17 points of possible 20 of Tarraleah B power station, and 5 points of possible 20 of laydown area; *8 of possible 20 points of power station visible through vegetation.*	Up to 6 of possible 35 points of transmission line. *5 points of possible 35 visible through vegetation.*
Tarraleah Hydro Park (adjacent to existing Tarraleah power station)	<1	24	15	-	-	16 points of possible 20 of Tarraleah B power station laydown area, and 4 of possible 20 points of Tarraleah B power station; *2 points of possible 20 of Tarraleah B power station laydown area, and 11 points of possible 20 of power station*[37].	4 points of possible 35 points of transmission line. *2 points of possible 35 points visible.*
Tungatinah Lagoon campground (second campsite to the north of lagoon, not visible from campground to the southwest)	3	49	0	3 points of possible 20 of mid access tunnel portal and 10 points of possible 20 of mid access works.	16 of possible 20 of surge tower.	-	Up to 4 of possible 35 points of transmission line.
Campgrounds at Lake Binney,	5-9	Up to 6	Up to 3	-	-	-	Up to 6 of possible 35 points of transmission

[37] Refer to footnote 36.

Public tracks and roads with distance from redevelopment	Km	Total points DEM	Total points DSM	Headrace tunnel and pipeline (DEM/*DSM*)	Surge tower (DEM/*DSM*)	Tarraleah B power station (DEM/*DSM*)	Transmission line (northern option) (DEM/*DSM*)
Bradys Lake, and Bronte Lagoon							line visible from the campgrounds. *3 points of possible 35 visible from Bradys Lake campground.*
Wayatinah Lagoon (including Wayatinah Lakeside Caravan Park)	11	0	0	-	-	-	-
Visitor accommodations at Derwent Bridge	15	0	0	-	-	-	-
Lake St Clair Lodge and Tourist Park, and Fergys Paddock campground	18-19	0	0	-	-	-	-

Table 4.3 Theoretical visibility of the various components of the **whole redevelopment** from key locations in the absence (DEM) and presence of vegetation (DSM). The total number of points of the DEM and DSM is given to get a sense of the screening capacity of vegetation for each location. **Extent of visibility in the DSM (where visible through vegetation) is written in *italics***. Distance (Km) is measured from the observation point to the nearest component. (*continues from previous pages*)

The GIS assessment included a review of residential buildings that may have views to the infrastructure and facilities. This included a review of buildings near Dee Lagoon, Lake Samuel, Highland Waters, Bradys Lake, Wayatinah, Lake St Clair, Bronte Park, Osterley, and Bronte Lagoon and Tarraleah. The results indicate that some redevelopment infrastructure is visible from buildings (visitor accommodations) in Tarraleah village. Up to ten points of possible 35 of the transmission line is visible from a few residences in the other locations in the absence of vegetation. In the presence of vegetation, this number is greatly reduced to one or two points from nine of the buildings at Bradys Lake and one or two buildings at Bronte Park and Bronte Lagoon.

In the absence of vegetation, some accommodation buildings in Tarraleah village on Oldina Drive may observe up to 20 points of a possible 20 of the surge tower, up to 20 of possible 20 points of the No. 02 Pond pump station and the suction main to the pond pump, and up to three points on the surge tower earthworks, as well as up to 4 points of possible 35 of the transmission line. These accommodations also see the existing surge tower which is to remain. In the presence of vegetation, these buildings can view up to 15 points of the proposed surge tower and up to 4 points of the transmission line.

In addition to the proposed infrastructure that was modelled in GIS, there is a construction camp and workshop proposed for Oldina Drive in Tarraleah, ~800m off the Lyell Highway via Oldina Drive and Palana Crescent. The land tenure at the proposed construction compound is Private Freehold (owned by Hydro Tasmania). The proposed temporary workshop and camp will be constructed in existing cleared areas and surfaced with locally sourced gravel, where possible.

An assessment of relative visibility of the construction compound was not undertaken in this report. Nevertheless, it is noted that the views along Oldina Drive, Palana Crescent, Probula Avenue (which gives access to Tarraleah Golf Club), and from Tarraleah Golf Club will be highly impacted by the compound. However, these transport segments are local with very low traffic volumes. Oldina Drive is currently closed to public access. Hydro Tasmania will undertake appropriate consultation with members and users of the Golf Course, as well as with the general public ahead of any disturbances.

In the **foreground** view (less than 1km), the following views are likely:

- in the absence of vegetation, the headrace tunnel, pipeline and spoil emplacement areas will be seen along Butlers Gorge Road; mid access tunnel is similarly visible as the road nears and runs parallel to the tunnel infrastructure.

However, except for a few points to the western segment of Butlers Gorge Road, most views are screened by vegetation;

the surge tower and associated infrastructure, and the No. 02 Pond pump station may also be seen mid-way along the Butlers Gorge Road in the absence of vegetation, however, these views are considerably well screened by vegetation. In the presence of vegetation, the DSM modelling suggests there are no viewing opportunities to this infrastructure from along Butlers Gorge Road, if any infrastructure comes into view, it is mostly likely to be very brief glimpses when viewed from moving vehicles;

there will be close views of the mid access tunnel, surge tower, No. 02 Pond pump station, Paddys Quarry spoil emplacement areas and the Tarraleah B power station from Lyell Highway where the infrastructure is in the foreground of the view from the highway. However, these views will most likely be brief and sporadic due to reasonable screening by existing vegetation;

glimpses of the mid access tunnel portal infrastructure, and views of the No. 02 Pond pump station and surge tower are visible from Lyell highway near Tungatinah Conservation Area and the No. 02 Pond, and at the intersection to the southern end of Fourteen Mile Road in the presence of vegetation, however, these are again likely to be brief due to reasonable screening by existing vegetation;

long duration views of the surge tower, pond pump station and new power station are possible from points of interest in Tarraleah, including the Tarraleah Falls trail and Tarraleah lookout. The pump station and new power station are, however, reasonably screened by vegetation and would only be seen at the edge of the foreground distance, visibility to infrastructure from along the Tarraleah Falls trails is mostly limited to the start of the track in the presence of vegetation; and,

in the absence of vegetation, some of the northern transmission line option is visible in the foreground from Tarraleah Village, Lyell Highway and from Victoria Valley Road. These views are reasonably screened by existing vegetation, however some of the transmission line is still visible from Tarraleah Village and from the southern end of Dee Lagoon.

Visibility of the redevelopment infrastructure is greatly reduced by existing vegetation. In the absence of vegetation, travellers along Butlers Gorge Road, Lyell Highway and

those visiting and residing in Tarraleah would have long duration views of the key infrastructure.

In the **midground** (1-5km), the following views are likely in the absence of vegetation:

> to the surge tower and associated infrastructure from Butlers Gorge Road, Fourteen Mile Road, and the Lyell Highway; and to the Paddys Quarry spoil emplacement areas from the latter two roads;
>
> to the mid access tunnel infrastructure and surge tower from Lyell Highway near Tungatinah lagoon and Tungatinah Conservation Area;
>
> to the surge tower from residences and other buildings and points of interest from Tarraleah village (Photomontage 1 and Attachment E); and,
>
> to the transmission line from Butlers Gorge Road, Lyell Highway, Fourteen Mile Road, and Victoria Valley Road, as well as from campgrounds and residences at Lake Binney and Bradys Lake.

These views are reasonably well screened by existing vegetation, some points on the surge tower and No. 02 Pond pump station are visible through vegetation from residences and other buildings in Tarraleah village, and there are limited viewing opportunities to the transmission line from Lake Binny and Bradys Lake.

In the **background** (5-20km), in the absence of vegetation, the following views can be seen:

> from the Lyell highway near Bradys Lake, and north of Lake King William, and from the northern intersection between Lyell Highway and Fourteen Mile Road travellers can potentially see glimpses of the mid access tunnel infrastructure and surge tower. The surge tower is also visible at a couple of points towards the north of Fourteen Mile Road, and at the entrance to Victoria Valley Road;
>
> the surge tower is visible over a <500m length along the Bradys Lake walking track close to the end of the track;
>
> the No.02 pump station and surge tower are visible in full along with some of the associated infrastructure including suction main and the access track, as well as surge tower earthworks and the transmission line are visible from the final kilometre of the Mount King William I track;

there is very limited viewing to headrace pipeline infrastructure from Mt Rufus tracks;

the new transmission line and surge tower from along the first half of the walking track at Clarence Lagoon; and

headrace pipeline and mid access tunnel infrastructure are visible from along most of the last two kilometres of the Wylds Craig walking track.

Based off the seen view modelling undertaken, none of the other walking tracks and camping/recreational areas inside the TWWHA will see the redevelopment, either with or without vegetation, including tracks at Lake St Clair, Gingerbread Track, and Jane River Track.

In the presence of vegetation, views to the redevelopment infrastructure from viewpoints located in the background are greatly reduced:

views from Lyell Highway, Victoria Valley Road and Fourteen Mile Road are no longer had with the exception of very limited glimpses of the transmission line;

most infrastructure is not visible from Mt King William I track with the exception of the surge tower (up to 12 points of possible 20 can still be seen) and a very limited number of points (up to 3 points of possible 35) of the transmission line; and

there are views to limited points of the mid access tunnel infrastructure visible from along the final 800m of the Wylds Craig track, much of the transmission line remains visible in the presence of vegetation along most of this track.

The redevelopment is otherwise unseen in the background from publicly accessible locations.

Photomontage conducted from the summit of Mt King William (Photomontage 2 and Attachment E) provides an indication of the extent of visibility of the surge tower. The tower is viewed on a distant ridge, below the skyline and is not easily discernible due to the vegetated backdrop of a further ridge.

Existing vegetation provides considerable screening of the redevelopment in the background. In the presence of vegetation, the surge tower is visible from just two points

In the **far view** (>20km), in the presence of vegetation, the redevelopment is not visible from tracks and other viewpoints. In the absence of vegetation, the headrace pipeline infrastructure is visible to some extent towards the end of the Little Hugel Track, however, these views are well-screened by vegetation.

BotN – Tarraleah Surge Tower Visual Simulation
Oldina Drive – view from Village

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 454,716m
Northing: 5,316,528m
Elevation: 600.00m
Photo Bearing : 281°

Date: 06/07/2023
Time: 11:21 AM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 41.1°

Distance : 1.815 km

Photomontage 1 visual simulation of surge tower from Tarraleah village (Prepared by Hydro Tasmania)

BotN – Tarraleah Surge Tower Visual Simulation
View from Mount King William

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 428,933m
Northing: 5,316,162m
Elevation: 1326.0m
Photo Bearing : 109°

Date: 24/01/2024
Time: 12:23 PM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.3°

Distance : 25.35 km

Photomontage 2 visual simulation of surge tower from the summit of Mount King William (Prepared by Hydro Tasmania)

4.3.2 Overall Sensitivity to Change

Table 4.4 sets out a hierarchy of sensitivity ranging from high to low for several factors. Intermediate or moderate sensitivity is possible but not represented in the table. For example, the composition of the view is high if the view is from a fixed point and low if the viewer is on the move. Moderate sensitivity could occur if the viewer is on the move, but the alteration is seen as part of a focused view. This might occur if the development is directly ahead of the viewer as they drive along Lyell Highway.

Table 4.4 Conditions of high and low sensitivity for various factors.

Factor	High sensitivity		Low sensitivity
Composition of the view	Uniform, apparently natural landscape High scenic quality setting		Patterned landscape of mixed land use and/or vegetation Degraded/Low scenic quality setting
	Alteration is the focus of a panoramic view		Alteration seen as fractional part of a wider landscape
	View is from a fixed point (i.e. residences)		Viewer is on the move
Number of viewers	Alteration seen by large numbers of viewers[38]		Alteration unseen or seen by limited numbers of viewers
Distance	Alteration seen in the foreground (near)		Alteration seen in the background (far)
Duration	Alteration permanently in the view (i.e. residences)		Alteration only seen in glimpses (views from the road)
Viewer Expectation	Alteration located in a natural, apparently natural or largely undisturbed landscape		Alteration located in a highly modified landscape

38 Scenic Spectrums Pty Ltd adapted from Williamson, D. and Calder, S. 1979. "Visual Resource Management of Victoria's Forests: A new concept for Australia." Landscape Planning 6(3-4), 313-341.

Table 4.5 summarises the overall sensitivity of the development by providing an examination of the variables in Table 4.4 for each of the critical viewing locations. These are analysed in terms of distance as well as duration, view composition and viewer expectations. Each of these locations is given a sensitivity rating of either low, moderate, or high.

Table 4.5 Evaluation of sensitivity by viewing opportunity (location) using both sets of modelling. Note that high, medium and low are used rather than the number of viewing points because the actual number of modelled points is highly variable depending on the location and a sense of the extent of the impact is the goal. Distance indicated is to redevelopment infrastructure located closest to the viewing opportunity (*Continues following pages*)

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
Publicly accessible roads							
Butlers Gorge Road west	Landscape is mix of buttongrass plains, eucalypt forest and valley of the River Derwent with existing hydropower infrastructure visible as a consistent part of the landscape. Moderate scenic quality but highly altered	High	Low	< 1	5 to 10 minutes	People using this road are likely to be service vehicles, fishers, and campers. Other traffic movements are unlikely. These viewers likely to be accepting of existing development and proposed changes. Potentially some tourism interest associated with hydropower.	**Low** – low numbers of users, with little concern for changes in the affected landscape There is significant capacity to screen proposed redevelopment by retaining forest and replanting in key locations. Landscape already highly altered by existing hydropower.

39 Duration was calculated at (1) 80kph, and (2) 70kph where it passes through settlements (such as Tarraleah) or where road alignment demands greater attention, with some padding given to account for variation in driving speed between drivers.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
Butlers Gorge Road mid	As above	High	None	< 1	3 to 5 minutes	As above	**Low** – very low numbers of users, with little concern for changes in the affected landscape There is significant capacity to screen proposed redevelopment by retaining forest and replanting in key locations. Landscape already highly altered by existing hydropower.
Butlers Gorge Road east	As above	High	None	< 1	5 to 10 minutes	As above	**Low** – very low numbers of users, with little concern for changes in the affected landscape There is significant capacity to screen proposed redevelopment by retaining forest and replanting in key locations. Landscape already highly altered by existing hydropower.
Lyell Highway, leading up to No. 02 Pond pump station	Strongly enclosed, forested road corridor with little to no viewing opportunities through thick vegetation. Landscape opens up as the road nears Tarraleah village where alterations from hydro activity, including	High	Low	< 1	Fleeting	Tourism visitors and frequent travellers to the area arriving from the north and south would have driven through plantation forests and some areas altered by forestry operations. Frequent visitors to the area are likely aware of	**Low** - any views to the surge tower and pump station will be fleeting and to the side. The low-moderate traffic volumes with expectation of hydropower in the area result in low sensitivity.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
	Tarraleah canal come into view.					the hydroelectric history of the area, however, new visitors may not be aware of this development and the somewhat sudden introduction to hydroelectric infrastructure as one enters Tarraleah maybe incongruous with expectations of a forested landscape.	
Lyell Highway & Fourteen Mile south intersection	Open, grassy road corridors with forested backdrop close to pipelines, dam and other altered hydro elements.	High	High	< 1	Fleeting	As above	**Moderate** - views to the surge tower and pump station will be fleeting and to the side. The low-moderate traffic volumes with some expectation of hydropower in the area result in low sensitivity however, heightened by proximity and extent visible albeit for a brief period close to the intersection.
Lyell Highway, in Tarraleah village	Open, grassy road corridors with forested backdrop close to pipelines, dam and other altered hydro elements.	High	Low	< 1	2 to 5 minutes	As above	**Low** - moderate number of viewers; visitor expectations of seeing hydropower offsets what would otherwise be a high sensitivity area.
Lyell Highway, from Tarraleah village to	Steeply sloping road corridor with steep vegetated	Medium	Low	< 1	Fleeting	As above	**Low** – power station and laydown area will come into view ahead of the traveller, views are,

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
Tarraleah B power station.	embankments to one side and views to forested hills and distant mountains through vegetation to the other. The landscape opens up to cleared, altered areas with overhead transmission lines and other hydro related restructure as it arrives near the existing Tarraleah power station and the site for the new Tarraleah B station.						however, fleeting. The low-moderate traffic volumes with expectation of hydropower in the area result in low sensitivity.
Lyell Highway near Tungatinah forest reserve and Lake Binney	Steeply sloping road corridor with steep vegetated embankments to one side and some views to forested hills and distant mountains through thick vegetation to the other side.	High	Low	1-4	5 to 10 minutes	Tourism visitors and frequent travellers would have driven through landscapes modified by forestry operations, agriculture and hydroelectric developments.	**Low** – any views to the surge tower and pump station will be fleeting and through vegetation. The low-moderate traffic volumes with some expectation of hydropower in the area result in low sensitivity.
Fourteen Mile Road south	Patchwork of plantations, power line easements and a matrix of remaining native vegetation.	Medium	None	0 - 8	0 to 10 minutes	Landscape already significantly altered by forestry operations and powerline. Road not used for tourism, so low	**Low** - the vegetation will screen most views except where timber is cleared to the road edge. Surge tower is to the side and not

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
						expectation of natural setting.	in main line of sight ahead of driver/passengers.
Harbacks Road	Development not seen	-	-	-	-	Natural landscape	N/A
Lyell Highway near Bradys Lake to Victoria Valley Road intersection	Patchwork of plantations, power line easements and a matrix of remaining native vegetation.	Medium	Low	8.5	5 to 10 minutes	Landscape already significantly altered by agriculture. Road not used for tourism, so low expectation of natural setting.	**Low** - the foreground vegetation will screen views. Moderate number of road users, some with concerns for changes to scenic quality but off set by some expectations of hydropower in the area.
Laughing Jack Road	Development not seen	-	-	-	-	Natural landscape	N/A
Long Spur Road	Development not seen	-	-	-	-	Natural landscape	N/A
Lyell Highway, north of Lake King William (west of Fourteen Mile Road intersection)	Development not seen	-	-	-	-	Natural Landscape	N/A
Victoria Valley Road	Matrix of native forest vegetation on either side of road, road remains strongly enclosed along majority of the route with little to no viewing opportunities through thick vegetation.	Low	Low	-	-	Natural landscape leading up to Lyell Highway. Travellers would have entered through altered rural landscapes and plantation forests. Road mostly used by service	**Low** – foreground vegetation will screen views, low number of road users, some with concerns for changes to scenic quality but offset by some expectation of hydropower as they near Lyell Highway.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
						vehicles, fishers, and campers.	
Lake St Clair Road	Development not seen	-	-	-	-	Natural landscape with some tourist development	N/A
Fourteen Mile Road north	Flat open farmland and scattered remnant vegetation. Highly altered rural landscape.	Low	None	8	0-6 Minutes	Landscape already significantly altered by agriculture. Road not used for tourism, so low expectation of natural setting.	**Low** - the foreground vegetation will screen views. Low number of road users, some with concerns for changes to scenic quality but offset by the context of the degraded landscape along this road.
Lyell Highway inbetween Fourteen Mile Road north and Victoria Valley Road intersections	Flat open farmland and scattered remnant vegetation. Highly altered rural landscape.	Low	Low	8	15 - 20 minutes	Farmland that becomes increasingly forested to the south. Not much used because the through road is the Lyell Highway.	**Low** – vegetation and/or topography will screen views. Moderate number of road users, some with concerns for changes to scenic quality but offset by the context of the degraded landscape along this road.
Marlborough Road, Bronte Park	Flat open road passing through alpine heathland and native grasslands with some scattered residences. The road begins off Lyell Highway near Bronte Park giving access to the Central Highlands.	Low	Low	-	-	Natural landscape with some residences, tourism visitors and frequent travellers would have driven through landscapes modified by forestry operations, agriculture or hydroelectric developments. Visitors	**Low** – moderate number of road users with some concerns for changes to scenic quality offset by limited visibility to transmission infrastructure which may be accepted as a facet of modern life.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
						may have some expectation of views to transmission infrastructure as a facet of modern life.	
Walking tracks outside TWWHA							
Tarraleah Falls Trail	Mix of settlement, hydroelectric infrastructure, and natural scenery	High	Low	< 1	Brief at the at the start of the walk	The trail begins at the end of Oldina Drive. Visitors and residents will have views of the Tarraleah settlement, overhead transmission lines and penstocks at the start of the trail	**Low** – the foreground vegetation will screen views. In the event of a fire, the removal of this ridge vegetation will reveal views of surge tower. Frequent travellers to the area will be aware of the hydropower generation in the area and new visitors will have become aware as they arrived in Tarraleah and entered the trail.
Recorder Track	Mix of hydroelectric infrastructure and natural scenery. Limited views to infrastructure through vegetation.	Low	Low	1.3	Brief views through vegetation	The trail begins off Lyell Highway close to Tarraleah Village. Visitors are likely to have travelled through Tarraleah village and altered landscapes and may have some expectation of views to infrastructure.	**Low** – most views are screened by foreground vegetation/topography. Relatively low use. Frequent visitors will be aware of the hydropower generation in the area and new visitors will have become aware as they arrived in Tarraleah and entered the trail.
Bradys Lake	Altered landscape with canals, dams, cleared areas, fencing as well	Low	Low	7.5	5 minutes	Largely natural environment although not easily accessed	**Low** – the foreground vegetation will screen views. In the event of a fire, the removal of this lake-edge

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
	as patches of native forest					except by boat. Close to shacks across lake therefore some expectation of alterations in landscape.	vegetation will reveal views of surge tower. Relatively low number of users with some concerns for scenic quality but offset by the context of the degraded landscape as they reach the track.
Dee Lagoon	Natural dry eucalypt landscape with some evidence of hydroelectric infrastructure.	Low	Low	5	Brief views through thick vegetation	Trail to the Lagoon starts near a small shack settlement along Victoria Valley Road. Tourism visitors and frequent travellers would have driven through landscapes modified by forestry operations, agriculture and hydroelectric developments.	**Low** – most views will be screened by foreground vegetation. Relatively low number of users with some concern for scenic quality but offset by the context of the altered landscape of the area as they reach the track.
Walking tracks inside TWWHA							
Heals Spur, near Wayatinah Lagoon	Development not seen	-	-	-	-	Expectation would be for a largely natural setting, although there are plantations nearby.	N/A
Lake Rufus Route	Development not seen	-	-	-	-	High expectation of natural view and wilderness experience	N/A
Mt King William I	The track climbs gently at first along a fire trail before traversing	High	Low	11 (distance to surge	Variable depending on length of	Expectation would be for a largely natural setting but with some	**Moderate** – most views are screened by vegetation and/or topography (headrace pipeline

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
	through eucalypt forest and pockets of buttongrass moorland on a sharp incline. Relatively open views are available to the summit before the landscape opens to sub alpine heathlands on the approach to and at the summit. At higher elevations the bedrock is exposed, revealing excellent views back to Lake King William and the King William Range as well as to the west.			tower and transmis-sion infrastru-cture >25 km)	time spent at summit. Opportunity for sustained viewing at summit.	expectation of views to infrastructure having travelled through landscapes modified by existing forestry operations, agriculture and hydroelectric infrastructure.	infrastructure is screened by topography), in the event of a fire, the removal of this surrounding vegetation will reveal views of surge tower and related infrastructure, and the transmission line. Low to moderate number of walkers with high concern for scenic and wilderness values. Despite being able to see the surge tower and some of the transmission line, the >25km distance and the panoramic view will make these elements hard to distinguish. Neutral (mid-grey tone) colour of surge tower might make it more visible, particularly on a cloudless day, but as a distant background feature. These factors offset what would otherwise be a high sensitivity area.
Linda Track	Development not seen	-	-	-	-	As above	N/A
Gingerbread Track upper section	Development not seen	-	-	-	-	As above	N/A
Gingerbread Track lower section	Development not seen	-	-	-	-	As above	N/A

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
Lake Dixon/Lake Undine	Development not seen	-	-	-	-	As above	N/A
Lake St Clair tracks (incl. Cuvier Valley, Frankland Beaches Walk, Platypus Bay Track)	Development not seen	-	-	-	-	As above	N/A
Wylds Craig	Start of the walk is a logging coupe and altered landscape but areas become increasingly natural and intact especially once above forest and around the summit. ~ 10km round trip to the summit.	High	Medium	19	15 to 30 minutes (walking)	High expectation of natural views to west and altered views to roads and production landscapes to the east. Infrequently visited track.	**Moderate** – located within the TWWHA where visitors would have high scenic concern however low number of users suggests a lower rating. Despite being able to see glimpses of some key elements of the redevelopment, the 19km distance and the panoramic view will make it hard to distinguish. Transmission line might be visible but difficult to distinguish against vegetated backdrop unless seen on the skyline.
Jane River	Development not seen	-	-	-	-	Natural landscape with high wilderness values	N/A
Mount Rufus tracks	Highly natural landscape, the tracks climb through thick eucalypt forests and patches of rainforest. Approaching the summit the landscape	Low	None	20	Fleeting	Views from the summit are largely to other areas within the TWWHA. Visitors to the area would be sensitive to visual intrusions in the field of view, albeit with an	**Low** – foreground vegetation screen views and 20km distance puts any glimpses of infrastructure into the far view where elements will be difficult to distinguish.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
	opens to sub-alpine forest and heathland.					expectation that in viewing east they are looking into a more settled region of the State.	
Clarence Lagoon	Natural area that is a short walk from a 4km 4WD track.	Mod	Low	20	10 minutes	Mostly used by fishers accessing stocked brook trout. Not tending to look to distant views.	**Low** – the foreground vegetation will screen views and 20km puts any infrastructure into the far view.
Shadow Lake Track	Development not seen	-	-	-	-	Natural landscape with high wilderness values	N/A
Franklin River Nature Trail	Development not seen	-	-	-	-	Natural landscape with high wilderness values	N/A
Little Hugel Track	Highly natural landscape, track climbs through thick temperate rainforest. Panoramic views from the summit to Lake St Claire and surrounding mountainous landscape.	Low	None	22.5	Fleeting	Views from the summit are largely to other areas within the TWWHA. Visitors to the area would be sensitive to visual intrusions in the field of view, albeit with an expectation that in viewing east they are looking into a more settled region of the State.	**Low** – the foreground vegetation will screen views and >20km distance puts any glimpses of infrastructure into the far view.
Observation Peak to Diamond Peak route (Prince of Wales Range)	Highly natural landscape, track connects Diamond Peak and Observation Peak within the Prince of Wales ranges. Track	Low	Low	23.3	Fleeting	Panoramic views from the summit with high wilderness value. Limited number of walkers.	**Low** - the foreground vegetation will screen views and >20km distance puts any glimpses of infrastructure into the far view.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
	is not promoted or formalised and is accessed as part of a multi-day hike across the Prince of Wales ranges. Thick rainforest landscape that opens to moorland along the spine of the range.						
Frenchmans Cap	Development not seen	-	-	-	-	Natural landscape with high wilderness values	N/A
Points of interest							
Tarraleah Golf Course	Mixed use landscape with the open areas of the golf course	High	Low	< 1	Variable depending on length of stay; minimum 5-minute drive to sustained views if on foot/using the course	Tarraleah area is well known for the penstocks and surge towers so most visitors will be expecting to see infrastructure. Highway travellers will have their view dominated by the cleared areas of the golf course.	**Moderate** - visitor expectations of seeing hydropower modify what would otherwise be a high sensitivity area given that the development is in the immediate area.
Tarraleah Village (residences and visitor accommodation)	Highly altered environment of settlement of Tarraleah; penstocks, surge towers set in natural context	High	Low	< 1	Sustained views	Most visitors expect to see hydroelectric development given the area's history of hydro generation, albeit in a setting retaining many naturalistic qualities sensitive to change.	**Moderate** – moderate number of viewers; visitor expectations of seeing hydropower offsets what would otherwise be a high sensitivity area.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
						Those unaware of the history of the area would become increasingly aware as they enter and travel through the Tarraleah settlement area.	
Tarraleah Hydro Park (adjacent to existing Tarraleah power station area)	Natural area dominated by the power station infrastructure and the penstocks. Significant number of fences, gating and structures.	Low	Low	< 1	Sustained, especially if stopping to visit or to picnic	Visitors who were unaware of hydropower developments in the area might be surprised by this pocket of industry. Most will pass through in minutes but there are toilets and an interpretation panel here for those who want to stop.	**Low** – low to moderate number of visitors; the area is already highly altered, including fencing and gates that make it difficult to see the heritage values of the old power station.
Tarraleah Lookout	Overlooks a highly modified landscape dominated by power station infrastructure in the focal view and plantations forests in the surrounding and background. The lookout features hydroelectric development as a key feature of scenic interest.	Medium	Low	<1	Sustained views depending on length of stay	Most visitors expect to see hydroelectric development given the area's history of hydro generation, albeit in a setting retaining many naturalistic qualities sensitive to change. Those unaware of the history of the area would become increasingly aware as they enter and travel through the	**Moderate** – moderate number of viewers; visitor expectations of seeing hydropower offsets what would otherwise be a high sensitivity area.

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
						Tarraleah settlement area.	
Tungatinah Lagoon Campground	Camping area overlooking the Tungatinah lagoon and surrounded by native forests.	Medium	None	3	Sustained views depending on stay	Visitors arriving from the south who are unaware of the hydroelectric history of the region would become aware as they travel through Tarraleah. Those arriving from the north would drive through a largely naturalistic landscape with overhead transmission lines.	**Moderate** – the foreground vegetation will screen views. In the event of a fire, the removal of this lagoon-edge will reveal views to the surge tower. Low to moderate number of viewers with some expectation of an isolated, natural landscape. Some visitor expectations of seeing hydropower offsets what would otherwise be a high sensitivity area.
Campgrounds at Lake Binney, Bradys Lake and Bronte Lagoon	Camping area overlooking respective Lakes/lagoons. Surrounded by native forest and mix of settlement and some evidence of hydroelectric infrastructure.	Low	Low	5-9	Sustained views depending on stay	Natural and somewhat isolated landscapes overlooking lake/lagoon. Visitors arriving from the south who are unaware of the hydroelectric history of the region would become aware as they travel through Tarraleah. Those arriving from the north would drive through a largely naturalistic landscape with overhead transmission lines.	**Low** - the foreground vegetation will screen views. In the event of a fire, the removal of this lake-edge vegetation may increase some views to transmission line. Low to moderate number of viewers with some expectation of an isolated, natural landscape. Some visitor expectations of seeing hydropower offsets what would otherwise be a high sensitivity area.
Wayatinah	Development not seen	-	-	-	-	Natural landscape with some residences	N/A

Viewing opportunities	Viewing composition: Disposition, Scenic quality, Condition	Theoretical number of views (DEM)	Likely number of views with veg (DSM)	Distance (km)	Duration[39]	Viewer expectation	Resulting Sensitivity
Derwent Bridge	Development not seen	-	-	-	-	Natural landscape with some residences	N/A
Lake St Clair Lodge and Tourist Park, and Fergys Paddock campground	Development not seen	-	-	-	-	Lodge and Tourist park set in natural landscape. Campground set in natural landscape, overlooking Lake St Clair	N/A

Table 4.5 Evaluation of sensitivity by viewing opportunity (location) using both sets of modelling. Note that high, medium and low are used rather than the number of viewing points because the actual number of modelled points is highly variable depending on the location and a sense of the extent of the impact is the goal. (*Continues following pages*)

Review of Tables 4.4 and 4.5 suggests that the redevelopment site has **low** to **moderate** sensitivity to change. The following factors contribute to this rating:

that most of the near and midground views are screened by topography and vegetation (low sensitivity);

the long and evident history of hydro industrialisation associated with the region (low);

the development cannot be seen from more sensitive viewing areas, such as from commonly used tracks and viewpoints in the TWWHA (low);

where views to infrastructure occur from within publicly accessible tracks in the TWWHA only a very limited number of points may be viewable through vegetation of infrastructure located in the far view (low);

that views from Wylds Craig and Mt King William I to infrastructure are more substantial, however, these areas have relatively low visitation compared to other areas (such as the Lake St Clair tracks) and are located in the background and far view of the visible infrastructure (moderate);

views from the highway are in glimpses and rarely in a focal view, with roadside screening and topography reducing the duration of viewing and the impact of the prominence of the redevelopment (mostly the surge tower) against the skyline (low);

some of the foreground views are from Butlers Gorge Road, Lyell Highway in proximity of Tarraleah village, and Tarraleah village, where the existence of hydropower infrastructure is expected or unavoidable (moderate);

the landscape is of moderate scenic quality and lacking the iconic dolerite peaks and dramatic forms of landscapes further west; and

the landscape is highly variable in terms of a patchwork of natural and built forms, including hydropower, plantations, harvested coupes, access roads and tracks as well as the golf course and buildings of Tarraleah (moderate sensitivity).

4.4 Visual Absorption Capability

Visual absorption capability (VAC) is a measure of the inherent ability of a landscape to accommodate visual change. VAC is considered an offset in the evaluation of the magnitude of impact expected in its absence.

Absorption capability is affected by:

physical factors (topography, prominence, vegetation, soils);

perceptual factors (distance, aspect to the viewer, number of viewing points, number of viewers and duration of viewing, see also Section 4.3); and

visual characteristics of the alteration (form, scale, colour, and contrast to surrounds and the permanency of the alteration).

Table 4.6 evaluates the physical factors affecting the visual absorption capability of the landscape immediately adjacent to each element of the proposed redevelopment. Consideration is also given to the characteristics of the element. Perceptual factors have previously been considered in the evaluation of sensitivity (Section 4.3).

In general, visual absorption capability is shown in Table 4.6 to be **high to moderate** across most elements. Several factors contribute to this, including:

the redevelopment is mostly screened by tall vegetation and/or topography, including from most of the more sensitive viewing areas in the TWWHA (high visual absorption capability);

the surge tower, one of the more prominent features, will be briefly but prominently visible against the skyline (low) from roads, but the topography and vegetation screening mean that this view is quickly obscured;

much of the redevelopment is hidden from most passing traffic (on the Lyell Highway) and visitors (high);

the peaty, organic soils are common across the area and are dark in colour with a high visual absorption capability (high).

As seen in Table 4.6, the principal shortcomings limiting visual absorption capability are:

The permanent visibility of some of the elements (particularly new surge tower and transmission line); and,

the proximity of some of the more visible elements to residences and other key buildings and points of interest in Tarraleah village where the present redevelopment would add to the scale of already existing hydropower infrastructure.

Scenic interest (see Section 4.2.3) can also be seen as an offset to visual impact that ameliorates environmental impacts by adding positively to the landscape setting. The proposed redevelopment has **low to moderate** scenic interest with some offsetting value ascribed to it.

Good architectural building and landscaping design will have considerable impact on increasing scenic interest and improving opportunities to complement rather than diminish the high scenic interest of the existing valued heritage infrastructure.

Table 4.6 Visual Absorption Capability (VAC) by aboveground infrastructure element (*Continues following pages).* Rating of VAC for individual values is based on the Consultant's experience.

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
Headrace pipeline (including left and right service roads)	**High**	**Moderate:** • varied topography with several intervening higher landforms to reduce visibility.	**High/Moderate:** • not seen on skyline; • some points visible from a few areas with higher elevation but nearly all of these are not sensitive viewing areas.	**High:** • Eucalypt forests on adjacent landforms, including along Butlers Gorge Road, have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Moderate/High:** • surrounding soils dark in colour; • bare areas unlikely to be highly visible from higher elevations.	**Moderate:** • permanent alteration; • lighter colour of infrastructure contrasts with vegetation • bare, rigidly engineered form contrasts with natural landscape; • length of pipeline (~4.2km) increases viewing opportunity, particularly in the absence of vegetation;

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
							• low on the ground with high screening capacity.
Headrace construction laydown areas	**Moderate**	**High/Moderate** • immediate area of laydown is relatively flat; • topography and somewhat winding path of Butlers Gorge Road enables some screening in the approach to and away from the site.	**Moderate:** • not seen on skyline; • site adjacent to Butlers Gorge Road and oriented directly to road users; • some points visible from a few areas with higher elevation but nearly all of these points are not sensitive viewing areas.	**Moderate:** • no screening vegetation along segment of road immediately adjacent to proposed site; • existing Eucalypt vegetation along Butlers Gorge Road provides screening in the approach to and away from site.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevation.	**Low (pre-rehabilitation)** **Moderate (post-rehabilitation):** • temporary alteration; • relatively large site; • will be rehabilitated following completion of building works.

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
Headrace tunnel spoil emplacement area	**High**	**Moderate:** • varied topography with several intervening higher landforms to reduce visibility.	**High/Moderate:** • not seen on skyline; • some points visible from a few areas with higher elevation but nearly all of these points are not sensitive viewing areas.	**High:** • Eucalypt forests on adjacent landforms, including along Butlers Gorge Road, have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevations; • prominent exposed cut face with proposed rehabilitation	**Moderate/High:** • moderately large, engineered landform created using excavated material from tunnels, contrasts with naturalistic landforms; • potential for naturalistic shaping of landform; • vegetation clearance required with high potential for rehabilitation at conclusion of works.
Headrace tunnel western portal and mid access tunnel portal	**High/Moderate**	**Moderate:** • varied topography with several intervening higher	**High:** • not seen on skyline; • (headrace tunnel portal) visible from	**High:** • Eucalypt forests on adjacent landforms, including	**High:** • disturbed sites relatively quick to be revegetated	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevations;	**Moderate:** • permanent installation; • relatively small scale;

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
		landforms to reduce visibility.	some points with higher elevation but nearly all of these points are not sensitive viewing areas.	along Butlers Gorge Road have high screening capability.	when best practice techniques are used.	• prominent exposed cut face to be rehabilitated following construction.	• potential for rehabilitation following construction is high;
No. 02 Pond pump station	**High/Moderate**	**Moderate:** • varied topography with several intervening higher landforms to reduce visibility.	**High:** • not seen on skyline;	**High:** • vegetation along roads have high screening capability	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**High:** • soils not a factor.	**Low/Moderate:** • permanent alteration; • bare, rigidly engineered form contrasts with natural landscape; • good architectural design and landscaping has potential to increase scenic interest.
Rising main (pump station	**High**	**High:** • varied topography	**High:** • not seen on skyline.	**High:** • vegetation along roads	**High:** • disturbed sites	**Moderate:** • surrounding soils dark coloured.	**High/Moderate:** • permanent alteration;

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
to surge tower)		with several intervening higher landforms to reduce visibility.		have high screening capability.	relatively quick to be revegetated when best practice techniques are used.		• bare, rigidly engineered form contrasts with natural landscape; • relatively low on ground with high screening potential.
Surge tower	**Low**	**Moderate:** • cut into a slightly sloping ground with some potential screening from higher adjacent landforms; • varied topography of intervening landforms within the viewshed have some	**Low:** • seen on skyline; • well seen from higher elevations and from some sensitive viewing locations.	**Low/Moderate:** • intervening vegetation have high screening potential for base of tower; • offset by height of tower.	**Low/Moderate:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Low:** • soils not a factor	**Low:** • tall, steel tower visible against skyline in foreground and some middleground views; • bare, rigidly engineered form contrasts with natural landscape;

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
		screening potential; • offset by height of tower.					
Surge tower tunnel access portal	**Moderate**	**Moderate:** • varied topography with several intervening higher landforms to reduce visibility.	**High:** • not seen on skyline.	**High:** • vegetation along roads and intervening landforms have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevations; • prominent exposed cut face to be rehabilitated following construction.	**Low/Moderate:** • permanent installation; • relatively small scale • potential for rehabilitation following construction high.
Surge tower earthworks and works area	**High/Moderate**	**Moderate:** • higher intervening and adjacent landforms provide some	**High:** • not seen on skyline.	**High:** • vegetation along roads and intervening landforms	**High:** • disturbed sites relatively quick to be revegetated	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevations;	**Low (pre-rehabilitation) Moderate (post-rehabilitation):** • temporary alteration;

Infrastructure Element	Overall VAC rating	Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
		topographic screening.		have high screening capability.	when best practice techniques are used.	• prominent cut face	• vegetation clearance required; • potential to be rehabilitated following conclusion of works.
Paddy's quarry spoil emplacement area (3 spoil piles located northeast of surge tower access tunnel)	**High**	**Moderate:** • varied topography with several adjacent higher landforms to reduce visibility.	**High/Moderate:** • not seen on skyline; • spoils 2 and 3 can be seen from some point with higher elevation.	**High:** • vegetation along roads and intervening landforms have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Moderate:** • surrounding soils dark coloured reducing visibility from higher elevations; • initial colour contrast with surrounds modified with proposed rehabilitation	**Moderate/High:** • permanent alteration; • moderately large, engineered landforms created using excavated material from tunnels with potential for naturalistic shaping of landform; • vegetation clearance required but rehabilitated following construction.

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
Tarraleah B power station	**Moderate**	**High:** • cut in moderate to sloping ground but with high potential screening by adjacent and intervening landforms.	**Moderate:** • not seen on skyline; • located in close proximity to Tungatinah power station and existing Tarraleah power station and penstocks amplifies prominence.	**High:** • vegetation along roads and intervening landforms have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Low:** • exposed light (yellow to brown colour) soils to be rehabilitated.	**Moderate:** • permanent alteration; • large, architecturally designed building with potential for high scenic interest.
Transmission line (northern option)	**Low/Moderate**	**Moderate:** •varied topography with several adjacent higher landforms to reduce visibility.	**Moderate/Low:** • some towers are seen above skyline; • co-located in the same easement as the existing 110kV	**High:** • vegetation along roads and intervening landforms have high screening capability.	**High:** • disturbed sites relatively quick to be revegetated when best practice techniques are used.	**Low:** • exposed light (yellow to brown colour) soils to be rehabilitated.	**Low:** • permanent alteration; • bare, rigidly engineered form contrasts with natural landscape; • situated on an existing easement

Infrastructure Element	**Overall VAC rating**	**Factors affecting visual absorption capability (High = high capacity of the landscape to visually absorb element, Low = Low capacity)**					
		Topography and Slope	Prominence	Existing Vegetation	Vegetation – Rehabilitation Capacity	Soils	Characteristics of the Alteration
			Tungatinah to Waddamana transmission line.				with 30m of additions vegetation clearance required.

Table 4.6 Visual Absorption Capability (VAC) by aboveground infrastructure element (*Continues previous pages).* Rating of VAC for individual values is based on the Consultant's experience.

4.5 Magnitude of impact

Visual impact refers to the lack of contextual fit and coherence in a landscape. Visual impacts occur where change to the scenic attributes of the landscape is brought about by the introduction of visual contrasts that alter the viewing experience. Visual impacts can be positive or negative, and those that detract from the viewers appreciation of the scene are considered negative.

In many landscapes, change to a setting is expected as development occurs, and cultural patterns of settlement evolve. While visual variety is valued, alterations that permanently deviate from the existing character are considered a visual impact in visual management planning. Importantly, the premise of visual management is that the inherent visual character of each part of the landscape (i.e. Landscape Character Type) is to be protected.

In evaluating the magnitude of an impact, the alteration characteristics (Section 3), the contrast of the alteration with the landscape character (Section 4.1) and the visual absorption capability (Section 4.4) are considered. In this case, the geographic spread of the alteration footprint is considered of importance.

Parts of the redevelopment, such as the surge tower and transmission line, are prominent by design and therefore conspicuous in the landscape. The alteration type, its apparent deviation from the existing landscape character and the ability of the landscape to absorb or mitigate change all interact to affect the magnitude of the visual impact.

Table 4.7 sets out the criteria for evaluating magnitude of impact as high, moderate, or low. The assessment is an overall one using information from the previous sections to determine the overarching influence on the viewing opportunity.

Table 4.7 Definitions of magnitude of impacts from high to low

Magnitude of Impact	Rationale
High	Changes contrast strongly with the landscape character and viewing experience where the alteration will be viewed as a permanently dominant change to the setting
Moderate	Changes that are permanently visible but of a scale that is sub-ordinate to the setting or of an alteration type consistent with the landscape character and viewing experience
Low	Changes that are permanently visible but of a scale or alteration type that is subsumed in the setting and consistent with the landscape character and viewing experience

Overall, the redevelopment has a **low** magnitude of impact with some aspects of **moderate** impact because:

much of the redevelopment is sited in existing disturbed areas (**low**);

the works will mostly occupy relatively level ground with dark soils and/or will largely be unseen due to the screening value of the existing vegetation (**low**);

the elements of the redevelopment are consistent with existing hydroelectric generation features in the area (**low**);

highway users with clear, albeit brief, views to the development may be expecting to see alterations given the existing hydropower in the landscape (**low-moderate,** depending on the viewer); and

most elements are hidden by vegetation or topography but some (particularly, the surge tower) are more visible, yet fleetingly or subsumed in the setting (**moderate**).

4.6 Significance of Visual Impact and Mitigation

The significance of impact is an amalgam of the magnitude of impact (Section 4.5) and the sensitivity of the landscape to change (Section 4.3). The significance of impact suggests what mitigation measures might be needed to reduce the level of impact.

4.6.1 Evaluation of the Significance of Impacts Prior to Mitigation

Table 4.8 illustrates the risk matrix with the interactions of how sensitivity and magnitude of impact can be evaluated to determine the significance of an impact.

Table 4.8 Significance of Impact

		Magnitude of Impact		
		Low	**Moderate**	**High**
Sensitivity	**Low**	Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	High

An impact of very high significance is one that threatens to permanently alter the landscape character of a location, affecting a large number of viewers sensitive to change. Such an impact requires a review of the design to reduce the significance of the impact.

An impact of high significance is one where the landscape character is at risk of change, and likely requires additional planning and design considerations (as well as the inherent controls and proposed construction methods) to reduce the significance of the impact.

Impacts that are rated moderate are those where the magnitude of impact is either moderate to high and the sensitivity is low to moderate, or where sensitivity is high, but the magnitude of impact is low. In these situations, construction method mitigation measures are required in addition to the Inherent controls. Treatments may vary in selected areas where either the magnitude of impact or sensitivity varies to that for the larger viewing opportunity.

In the situation where there is a moderate significance of impact, inherent and additional mitigation measures are relied on.

Impacts that are rated a low significance include those where the magnitude of impact is low to moderate and occurs in areas where the sensitivity to change is low to moderate. In these situations, inherent mitigation measures are generally relied upon, but construction method mitigation measures may be required in selected areas where the magnitude of impact or sensitivity is greater than for the larger viewing opportunity.

Applying the findings from previous sections and using the hierarchy matrix set out in Table 4.8, the development is of **low** significance prior to any further mitigation measures being applied**.**

4.6.2 Basic Mitigation Measures

Visual impact mitigation is the actions taken (in order of preference) to:

minimise impacts to limit the significance of an impact;

rectify an impact by repairing, rehabilitating, or restoring the affected landscape; and/or

reduce the significance of an impact over time.

Regarding basic mitigation measures for the proposed redevelopment:

the foregoing sections have identified the potential significance of the impact as being low;

the significance of the visual impact in some areas suggests the need to consider: planning or design considerations in some instances in addition to the inherent controls; and proposed construction methods to further reduce the significance of the impact;

in general, the low significance of the visual impact suggest the principal opportunities to mitigate the visual impacts lies in the design of the elements to better match the character of their surrounds, than it is to make major changes to the design or location of the proposed elements of the redevelopment; and

despite the overall low significance of visual impact, best practice development would suggest that mitigation measures be applied to achieve the highest standard of outcome.

INHERENT MITIGATION

Hydro Tasmania have made several changes to their proposed design based on preliminary visual assessment. These changes both in siting and design have resulted in the low significance of impact overall assessed here. These activities are inherently part of the design and include:

- use of GIS data to understand the seen views;
- the integration of the redevelopment with existing hydro infrastructure of the Tarraleah scheme;
- the consolidation of the redevelopment, in part, in a similar location with other hydro infrastructure and facilities thereby utilising existing access roads, minimising vegetation clearing in previously undisturbed locations further afield;
- the siting of much of the water transport underground avoiding the visual impacts associated with the existing canals;
- general avoidance of infrastructure elements being sited on the skyline; and
- preliminary investigations by Hydro staff in the field to understand the potential visual impact issues arising from the redevelopment to inform specialist consultants.

CONSTRUCTION MANAGEMENT

Further mitigation is possible through best practice infrastructure construction management. These best practice measures are considered a requirement across the whole of the project no matter the significance of the visual impact. These measures include:

- develop and implement a vegetation rehabilitation plan that details the methods, monitoring and ongoing management required to successfully rehabilitate and revegetate disturbed areas. Measures will include but not be limited to:
  - early commencement of local seed and scion collection for use in rehabilitation;

retain vegetation, slash and chipped materials for reuse in rehabilitation to reduce erosion and promote seed dispersal in support of natural regeneration and to protect emergent plants;

revegetation of disturbed native vegetation areas by spreading clearing residue over disturbed areas to promote seed dispersal, natural regeneration and to protect emergent plants;

spreading of native vegetation seed in combination with infill planting in high visibility areas;

pre-planting of areas outside the redevelopment boundaries, including extension of transmission line easement, using locally native species where additional screening would be effective and/or to mitigate existing visual impacts (i.e. to reduce cumulative impacts;

regular inspection of revegetated areas to identify any weed invasion, erosion or sedimentation;

evaluate revegetation success quarterly for one year and bi-annually for a further two years and following storm events within this period; and

remediation of unsuccessful rehabilitation.

Insertion of the following measures into the construction contract:

penalty clauses in the construction contract to protect existing vegetation and to minimise disturbance;

strict construction boundaries around all elements to limit unnecessary disturbance to existing vegetation;

dust and wind erosion control requirements;

erosion and sediment control requirements; and

requirements for good housekeeping including prohibition of onsite burning, maintenance of clean worksites, use of tire wash to reduce tracking of sediments onto roads and progressive removal of stakes and flagging.

Planning and Design

Planning and design consideration should be given to those areas where the potential significance of the visual impact caused by the redevelopment is moderate. These include:

attention to:

varying vegetation clearance boundaries to create natural or organic effects rather than straight lines, including in relation to the transmission easement;

locating works and storage areas in the existing cleared areas;

minimising the impacts of repeated access of construction vehicles and equipment to avoid the loss of vegetative cover and erosion; and

use of materials of an appropriate finish to blend with the landscape and minimise potential for glint and glare;

taking particular care to maintain the vegetation screen around Paddys Quarry in the long term because this narrow strip of vegetation is key for screening the spoil emplacement areas from traffic on the Lyell Highway and other roads;

further minimising visual impacts of the spoil emplacement areas at Paddys Quarry and the headrace tunnel by benching excavation to create areas that are more naturalistic in form and more easily vegetated than rigid, engineered landforms;

locating the surge tower away from the ridgeline to minimise visibility and minimising the extent of clearing;

kink the alignment of the 600m access road to the surge tower from Fourteen Mile Road to avoid clear, straight-line focused view to the surge tower;

attention to the design and colour of the pump station building to minimise impacts to viewers;

treating hard surfaces with bitumen and/or dark gravel to reduce visual contrast of surrounding soils and the Tarraleah B power station; and

consideration during planning and detailed design of elements to:

continue locating works and storage areas in the existing cleared areas;

minimising the impacts of repeated access of construction vehicles and equipment to avoid the loss of vegetative cover, soil compaction, and erosion; and

use of materials of an appropriate finish and colour to blend with the landscape and minimise potential for glint and glare;

Consideration during planning and detailed design of the transmission line to:

reducing the height of the towers where viewed against the skyline;

amending the materiality of the lattice towers to better blend in with the surrounding landscape.

using alternative materials for the conductors and insulators, the use of 'non-specular conductors' and 'non-reflective coatings' on insulators is recommended for the length of the transmission line to reduce the visibility and contrast of conductors against the skyline and the landscape;

giving attention to vegetation management to the extended easement corridor to reduce the linearity of the easement edges and the area of disturbed ground exposed to view:

visual impacts are compounded where clearing of easements and/or the construction access tracks to towers results in bare ground the colour of which may contrast strongly with the colour of the adjacent vegetation.

The rationale for clearing vegetation under the transmission line is well understood, and the co-location of the new line in the same easement as the existing line inherently reduces visual impact:

Some relief from the linear appearance of the easement and the proposed 30m extension of the easement can be gained where;

the vegetation is retained or replanted;

the edge condition varies in shape to present a less continuous form or where vegetation is allowed to grow to a modest height; and/or,

the height of vegetation remaining in the corridor includes ground covers, shrubs and small trees.

4.6.3 Additional Mitigation Measures

The following additional mitigation measures should be considered for their value in further reducing visual impacts:

colour stain all visible concrete elements to tone down reflectivity using one of the following methods: dark coloured additive to general purpose concrete mix, application of a surface colour treatment such as an oxidizing compound, spray bitumen or a starchy material (to encourage moss formation);

separate topsoil from rock during excavation for revegetation. Laying topsoil over freshly cut rock has potential to reduce brightness and visibility;

use of a black background on all signage to reduce visibility at a distance; and,

use of black paint on buildings such as the surge tower, black coated cyclone fencing, and use of black aggregates in concrete mixes.

5. WILDERNESS IMPACT ASSESSMENT

As mentioned in Section 1, all of redevelopment works are outside the TWWHA, however, the TWWHA Management Plan (TWWHAMP) requires developers to assess any activity that may cause adverse impacts on the reserve's aesthetic and wilderness values.

Each person's perception of wildness varies. For those seeking a wild experience, wildness is only experienced in the raw without mitigating influences. The presence of hydroelectric infrastructure in the landscape could separate viewers from the sensual qualities of the landscape that differentiates wilderness from the everyday experience of their lived-in setting. For those pursuing an unbounded experience of the landscape, the distant views to the redevelopment site from visited areas within the TWWHA have been considered for their possible impact on the experience of wilderness sought by visitors to the reserve.

Elsewhere, Hydro have recognised this and expressed a concern about the visibility of their redevelopment proposal on the experience of the TWWHA by visitors recognising, however, that visibility alone is not a sufficient indicator of potential impact[40].

5.1 METHOD

Wilderness values are assessed using a modified form of the National Wilderness Inventory (NWI) approach. The original methodology as described in detail in the NWI Handbook of Procedures, Content and Usage and the current methodology in Hawes and Ling's 2015 update[41] uses a 500 m x 500 m grid on which evaluation of a range of variables is compiled. These variables include apparent naturalness, remoteness from settlement, time remoteness, and biophysical naturalness, for which there is a weighting factor based on a high to low gradient. (Table 5.1).

Inputs to the spatial analysis of wilderness values were derived from various sources including the Parks and Wildlife Service GIS, the Land Information Systems Tasmania, and Forestry Tasmania (now Sustainable Timbers Tasmania). The final wilderness index value is based on four variables that are described below (Table 5.2).

40 Inspiring Place 2019. "A manual for evaluating the visual impact of pumped hydro energy storage" Prepared for Hydro Tasmania.
41 Hawes, R. Ling, R. 2015. Tasmanian Wilderness World Heritage Area Assessment of Wilderness Value. https://listdata.thelist.tas.gov.au/public/TWWHA%20Wilderness%20Value%20Assessment%202015.pdf Accessed 11 Nov 2022

The results of the evaluation are a gradient of wilderness values running from urban to pristine within a range of 0 to 20[42]. A value nearing 20 indicates excellent wilderness quality suggesting increasing remoteness and naturalness. Values less than 5 represent heavily modified environments, such as urban areas.

While 'wilderness' is regarded as having values greater than 12, it is important that efforts are made to maintain naturalness in the TWWHA regardless of wilderness value rating.

Table 5.1 Weighting factors for the influence of different grades on wilderness quality. Source: Hawes and Ling (2015)

Wilderness Variables	**Grade**	**Weighting factors/values**
Remoteness from settlement	Major	1.00
	Intermediate	0.80
	Minor	0.74
	Isolated residences	0.66
Remoteness from access	Major	1.00
	Medium	0.71
	Low	0.33
	Very low	0.20
Apparent naturalness	Major	1.00
	Medium	0.40
	Minor	0.16
Biophysical naturalness	Largely undisturbed	5
	Selectively logged	2
	Clear-felled, cleared, agricultural land, plantation, impoundment, urban vegetation	1

42 Hawes et al. 2018. Redefining the definition of wilderness. Safeguarding the experiential and ecological values of remote natural land. Bob Brown Foundation Inc, Hobart, Tasmania. pp 50.

Table 5.2 Component variables of wilderness value in the NWI and revised methodologies. Source: Hawes and Ling (2015)

Variable	Explanation
Remoteness from settlement	Remoteness from towns, settlements and isolated residences.
Remoteness from access	Remoteness from features such as points and corridors that are associated with access (e.g. roads, walking tracks and airstrips). Categories of access features are weighted so that proximity to a road has a greater impact on the wilderness value than proximity to a walking track.
Apparent naturalness	Remoteness from features that impinge on the perception of naturalness such as settlements, roads, impoundments and transmission lines. Categories of features are weighted based on their perceived impact on the wilderness value. For instance, a Class 5 walking trail 1km long has a slightly lower impact on apparent naturalness than a hydroelectric impoundment that is 10km in length.
Biophysical naturalness	Extent to which a defined area (typically a grid square) is free from evidence of changes caused by modern technological society – specifically logging and grazing.

Remoteness from settlement and from access, and apparent naturalness are distance-based variables. That is, the value assigned to a particular grid-square would change based on the distance from the centre of the grid to the specific types of geographical features (such as the nearest point on a road).

Biophysical naturalness on the other hand, is assessed only by the conditions within the grid square. That is, it is a factor of the degree to which the vegetation in the 500m x 500m cell is altered.

5.2 Limitations

There is considerable debate about how wilderness should be measured and the implications for the management and protection of wild places[43]. The NWI was developed as a regional landscape tool and not for use in fine scale decision-making[44]. Efforts are being made to develop a GIS tool that will tackle some of the existing

43 Dixon, G. 2016. Loss of wilderness quality associated with the development of the Three (two) Capes Track. Tasmanian National Park Authority News 22.
44 Lesslie, R.G., Mackey, B.G., Preece, K.M. 1988. A computer-based methodology for the survey of wilderness in Australia. Environmental Conservation 15(3), 225-232

overlap in the components (specifically remoteness from settlement and remoteness from access (or time remoteness) and provide a transparent and agreed method for calculating wilderness quality.

Of importance, wilderness quality calculations do not directly include impacts on the wilderness recreation experience. Impacts on the recreation experience of wilderness and thus its wilderness value, however, correlate with the perception of changes to apparent naturalness and remoteness from modern technological society associated with the visual values impacts or noise impacts from a development.

5.3 Wilderness Context

In this study, evaluation of the impact of the development on wilderness values has relied on a site visit and review of wilderness quality mapping in 2015 (revised module) provided by LISTmap.

Wilderness quality mapping on the LISTmap covers the approximate western half of the redevelopment area from Lake King William intake to the headrace pipeline and up to just under 1km distance from the mid access tunnel. Wilderness quality of the area that is mapped is rated 8-10. This rating is likely affected by the lack of apparent (i.e. visible disturbance from past Hydro activities) and biophysical naturalness (impacted by forestry practices and hydro infrastructure) and its proximity to made roads (Butlers Gorge Road, Fourteen Mile Road and the Lyell Highway). In this case, wilderness quality would be positively affected to some degree by the area's distance to a settlement of any size.

Were it to be evaluated, the wilderness quality of the areas that have not been mapped would likely fall into the same range, i.e. 8-10 for similar reasons.

New works are likely to minimally affect the wilderness quality rating of the redevelopment area.

Beyond the redevelopment area, wilderness quality increases to the south and west, with ratings rising from approximately 8–10 in the middleground (within 5km) to greater than 12 at more distant locations.

Viewshed analysis indicates that the redevelopment is partially visible from Wylds Craig and Mt King William Track I, located within the TWWHA approximately 20 to 25km away. The wilderness quality along the Wylds Craig track is generally rated between 9 and 10.5, with the summit area rated at 13. The Mt King William I track area has a wilderness quality rating of 10.3.

A few elements of infrastructure may also be visible to a lesser extent from a few other tracks within the TWWHA (see Section 4):

> a few points of the headrace pipeline infrastructure may be visible in the absence of vegetation from a short segment of the Mt Rufus track where the wilderness quality is rated as 10.6, these views are entirely screened by vegetation, however;
>
> in the presence of vegetation, a very short glimpse of the surge tower and the transmission line may be possible from one point on the Clarence lagoon track, the wilderness quality rating of this area is 10;
>
> limited glimpses of the headrace pipeline infrastructure may be visible in the absence of vegetation from along the final leg of the Little Hugel track which has a wilderness quality rating of 12.2, these views are, however, entirely screened by vegetation; and
>
> very limited glimpses of the transmission line may be visible from some areas along the Observation Peak to Diamond Peak route in the presence of vegetation, the wilderness quality along this location has a value of 19.2 to 19.3.

The TWWHA is recognised for its Outstanding Universal Value (OUV), to which the wider landscape setting is a key contributing factor. The World Heritage Operational Guidelines emphasise the importance of recognising and protecting this broader setting to safeguard the OUV of World Heritage sites. Accordingly, this assessment considers the magnitude of impact of infrastructure elements on the wilderness index at key viewpoints within the 25km study area, including those within the TWWHA where the redevelopment may be visible (see Section 4).

5.4 Wilderness Value Impacts

The magnitude of the impact of the proposed redevelopment on wilderness values in the TWWHA is a function of the four variables in the National Wilderness Inventory and the impacts on the recreation experience of the wilderness.

Based on data from the DSM (Section 4.3 and Attachment D) the infrastructure elements visible from areas within the TWWHA are:

the headrace pipeline (including capping and left and right access roads), western tunnel portal and spoil emplacement area;

mid access tunnel portal and construction compound and spoil emplacement area;

surge tower and associated infrastructure; and

the new transmission line.

It is noted that most views to this infrastructure from within the TWWHA are screened by topography and existing vegetation. Viewshed analysis indicates that a very limited number of points on certain elements are visible through vegetation and from the summits of accessible walking tracks.

Table 5.3 sets out the criteria for evaluating the magnitude of impact of the proposed redevelopment as high, moderate, or low. An overall assessment is made using information previous sections of this report and consideration of wilderness value variables.

Table 5.4 describes the extent of visibility of each element from within the TWWHA. The extent of visibility is described based on the viewshed analysis in the presence of vegetation (Map 4.5) which presents a more realistic understanding of the viewing situation in the field where vegetation can be accounted for (the DSM model). Table 5.4 then evaluates the magnitude of impact (Table 5.3) of these elements for each of the four wilderness quality variables in relation to recreation experience. That is, the perception of changes to the apparent naturalness and remoteness of the TWWHA area from the visible infrastructure elements.

Table 5.3 Definitions of magnitude of impacts from high to low

Magnitude of Impact	Rationale
High	Development contrasts strongly with the wilderness value variable and the perception of changes to the recreation experience of wilderness. The alteration will be perceived as a dominant change degrading apparent naturalness and remoteness of the wilderness setting.
Moderate	Alteration that is permanently visible but of a scale that is sub-ordinate to surrounding wilderness where the visible features will be perceived as incongruous to the apparent naturalness and remoteness but wilderness values still dominate.
Low	Changes that are permanently visible but of a scale or alteration type that is subsumed in the setting and consistent with the wilderness setting and wilderness recreation experience.

Table 5.4 Evaluation of the magnitude of impact of visible elements of the redevelopment on wilderness variables (*continues following pages*)

Infrastructure element	**Overall magnitude of impact on Wilderness Value variables**	**Extent of Visibility (in the presence of vegetation)**	**Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment**			
			Remoteness from settlement	**Remoteness from access**	**Apparent naturalness**	**Biophysical naturalness**
Headrace pipeline, tunnel portal, spoil emplacement area and construction laydown	**Low/Moderate**	**Low** Mostly limited (1-25% of the structure) and somewhat partial (26-50%) visibility from Butlers Gorge, Mt Hobhouse and Majors Lookout located south of the element and within 5 km (middleground). Viewing opportunities are limited to few	**Low/Moderate** No change to settlement distance but perception of remoteness and recreational experience where possible at Mt Hobhouse and Majors Lookout affected temporarily by the heavy presence of construction activity in the middleground.	**Moderate** Proximity to Butlers Gorge Road and temporary increase in vehicular activity during construction, as well as establishment of access roads to the pipeline introduces mechanised access towards the development	**Moderate** Pipeline and associated facilities will reduce apparent naturalness for those with views (in the middleground and background) who are seeking a wilderness experience.	**None** No change to the surrounding biophysical conditions of the TWWHA area.

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
		sparse points at higher elevation, with Majors Lookout offering the greatest visibility. May be limited to high visibility from the crest of Mt King William ranges (particularly spoil area), however, not visible from accessible areas within these ranges (i.e. Mt King William I track).	Perception of remoteness on the Mt King William ranges may also be affected temporarily by the presence of construction activity and potential views to some infrastructure, however, infrastructure will be in the background and not easily distinguishable.	that reduces perception of remoteness.		
Mid access tunnel portal, construction	**Low**	**Low** Limited views from high elevations	**Low** No change to settlement distance	**Low** Temporary increase in	**Low** Mid access tunnel and associated	**None** No change to the

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
compound and works area		south of the alteration in the background and far view. Viewing opportunities are limited to a few sparse points; particularly from along Wylds Craig track. Similarly visible from Mt Shakespear area however this are is not accessible to the public.	but perception of remoteness and recreational experience affected temporarily by the heavy presence of construction activity though in the background/far view where activity will be indiscernible. Very limited glimpses to mid access infrastructure that will likely be difficult to discern given distance from infrastructure.	vehicular activity during construction, introduces mechanised access towards the development that reduces perception of remoteness though in the background/far view.	facilities will reduce apparent naturalness for those with views who are seeking a wilderness experience. However, impact is offset by distance and by the relatively small size of the alteration in the wider panoramic view.	surrounding biophysical conditions of the TWWHA area.

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
Surge tower and associated infrastructure (including No. 02 Pond pump station, Paddys Quarry Spoils, etc.)	**Moderate/Low**	**Moderate** Infrastructure associated with the surge tower are not visible from areas within the TWWHA. The surge tower has the greatest visibility. The tower is visible partially or fully from a few, relatively small areas within the TWWHA to the south and southwest of the alteration. 75 to 100% of the surge tower is	**Low** No change to settlement distance but, in the middleground and background perception of remoteness and recreational experience may be affected temporarily by the heavy presence of construction activity. Infrastructure is mostly screened from within the TWWHA by vegetation to viewers	**Low** In the middleground, proximity to Butlers Gorge Road and Lyell Highway and temporary increase in vehicular activity during construction introduces mechanised access towards the tower that reduces perception of remoteness.	**Moderate** Presence of the surge tower where it is seen on the skyline will reduce apparent naturalness for those with views who are seeking a wilderness experience. The tower will be discernible in the middleground but not a dominant feature. Surge tower will be difficult to	**None** No change to the surrounding biophysical conditions of the TWWHA area.

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
		visible from these areas. In the middleground, the tower can be seen from Mt Hobhouse and a few sparsely distributed points south of the River Derwent, and southwest of the River Derwent in the background. In the far view, the surge tower is visible from Mt Shakespear and a small area within	with the exception of from Mt King William I track. The tower is partially visible in the far view and may be distinguishable with some scrutiny. The surge tower takes up a very small area of the panoramic field of view, however, offsetting any major influence on perception of remoteness.		distinguish in the background/far view (for instance from Mt King William I) given distance and the forested backdrop.	

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
		the Mt King William II and III area. The surge tower is visible from a considerable area of Mt King William I, including the associated track.				
Transmission Line (northern option)	**Low**	**Low** Limited to partial visibility through vegetation in the middleground, particularly from Mt Hobhouse area. Partial visibility of the transmission line from the Mt King William	**Low** No change to settlement distance but, in the middleground and background perception of remoteness and recreational experience may be affected temporarily by the heavy	**Low** As above	**Moderate** Apparent naturalness will be reduced for those with views to the transmission line, however, impact is lowered considerably by distance to the line (>20km to nearest tower); the	**None** No change to the surrounding biophysical conditions of the TWWHA area.

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
		Ranges and from Wylds Craig, including from the Mt King William I track and Wylds Craig track.	presence of construction activity. Partial visibility of the transmission line from Mt King William I and Wylds Craig may influence perception of remoteness from settlements, however, this influence is offset by distance of infrastructure (19 to 25km) and relatively small area that the alteration takes up in the field of view.		transmission line will be difficult to distinguish particularly when seen against a backdrop of forested hills/mountains. The transmission line easement will likely be visible, particularly if soil colour contrasts with surrounding dark vegetation. Rigidity of the easement is incongruous to the surrounding natural	

Infrastructure element	Overall magnitude of impact on Wilderness Value variables	Extent of Visibility (in the presence of vegetation)	Magnitude of impact on Wilderness Value variables of TWWHA areas with views to the redevelopment			
			Remoteness from settlement	Remoteness from access	Apparent naturalness	Biophysical naturalness
					landscape and influence perception of naturalness.	

Table 5.4 Evaluation of the magnitude of impact of visible elements of the redevelopment on wilderness variables (*continues from previous pages*)

Overall, the **magnitude of the impact** of the proposed redevelopment **on the experience of wilderness** by those visiting the TWWHA is considered to be **low** for the following reasons:

the visible footprint of the redevelopment from areas within the TWWHA is generally limited. Viewing opportunities are sparse and for the most part only partially seen, except for the surge tower, which may be seen in full though again from a relatively small number of locations;

visible features are small in scale compared to the expanse of the setting and will be seen in conjunction with existing disturbances with which they do not contrast strongly enough to be visually incompatible;

the numbers of visitors to areas within the TWWHA who might have views to portions of the redevelopment are thought to be low[45]; and

the limitations on visibility experienced by viewers looking from the middleground to background distances from which viewing might occur.

5.5 Mitigation

Potential impacts on the sense of wilderness could be mitigated by attention to implementation of the mitigation measures described in Section 4.6:

maintenance of the vegetation screen around the site; and

the colouring of surfaces to better blend with the surrounding vegetation (vision) i.e. the use of dark colouring agents/materials in concrete elements to darken their appearance.

[45] Some viewing may be had from the higher elevations of Wylds Craig 20km to the south and Mt King William I track located south west. These are known bushwalking destination within the TWWHA but is not strongly promoted as a destination. Visitors would be desensitised to disturbance in the distance due to modified landscape on approach to the tracks. No formal counts are made on these tracks (see Section 4.1.2).

The redevelopment is not visible from more promoted/popular destinations such Frenchmans cap and Lake St Clair, etc.

6. CONCLUSION

This report has considered the character, extent, and significance of the visual values of the redevelopment site and its surrounds within the LVIA scope (see Section 3).

The visibility of the redevelopment was shown to be largely restrained topographically to near (<1km) and midground (1-5km) views from Lyell Highway, Fourteen Mile Road and Butlers Gorge Road (Section 4). The **sensitivity** of these views was rated **low to moderate** given that views are mostly obscured or to the side of vehicle occupants with any frontal view being brief.

The landscape was found to have a **moderate to high visual absorption capability** which helped to minimise the potential visual impacts that might have arisen with less screening potential and works located at, or seen from, high points in the landscape.

Together, these factors suggested that the **magnitude of impact** of the development was **low to moderate**. Magnitude in conjunction with estimated sensitivity and visual absorption capability meant the conclusion was reached that development would have a **low significance of visual impact**.

Evaluation of the potential **impact on the experience of wilderness values** of those visiting the TWWHA was **low**. Inherent mitigation due to low numbers, distance and the small scale of the visible disturbances and that the application of additional measures to minimise visual impacts will further reduce this impact.

Provided that the recommended mitigation measures are undertaken, it is concluded that there are no substantive visual or wilderness impacts that affect Matters of National Environmental Significance under the EPBC Act[46]

It is concluded, therefore, that in both cases (i.e. the visual impacts and wilderness impacts) that provided the recommended mitigation measures are undertaken (on the whole or in large part) there are **no substantive visual or wilderness impacts that would preclude the redevelopment** of the Tarraleah Scheme from proceeding.

[46] The test for significant impact requires a world heritage value to be degraded, altered or modified. Our conclusion after assessing potential impacts to the outstanding universal values from the redevelopment is that there will be no significant impacts to world heritage values. From a visual and wilderness impact perspective, we do not consider the redevelopment to be a significant impact to MNES and no further assessment under the EPBC Act is considered necessary.

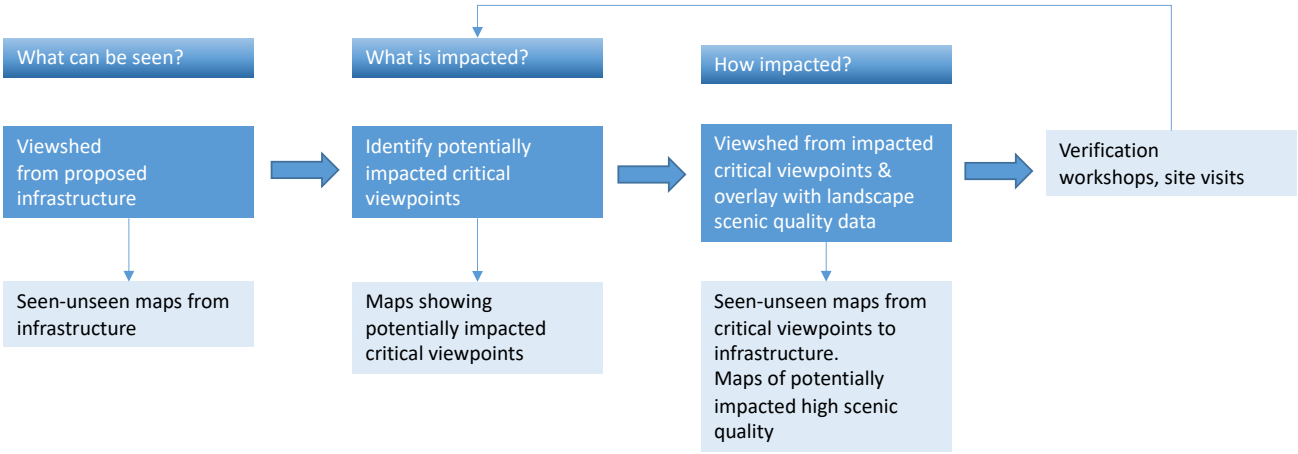
ATTACHMENT A GIS SPECIFICATIONS

Source: Entura

A.1 Approach

Entura have developed a desktop analysis approach to identify total seen views for proposed infrastructure and critical viewpoints. The approach utilises viewshed (ZVT) analysis to investigate visibility of proposed infrastructure as shown in Figure B.1.

FIGURE A.1 Total Seen View desktop methodology approach



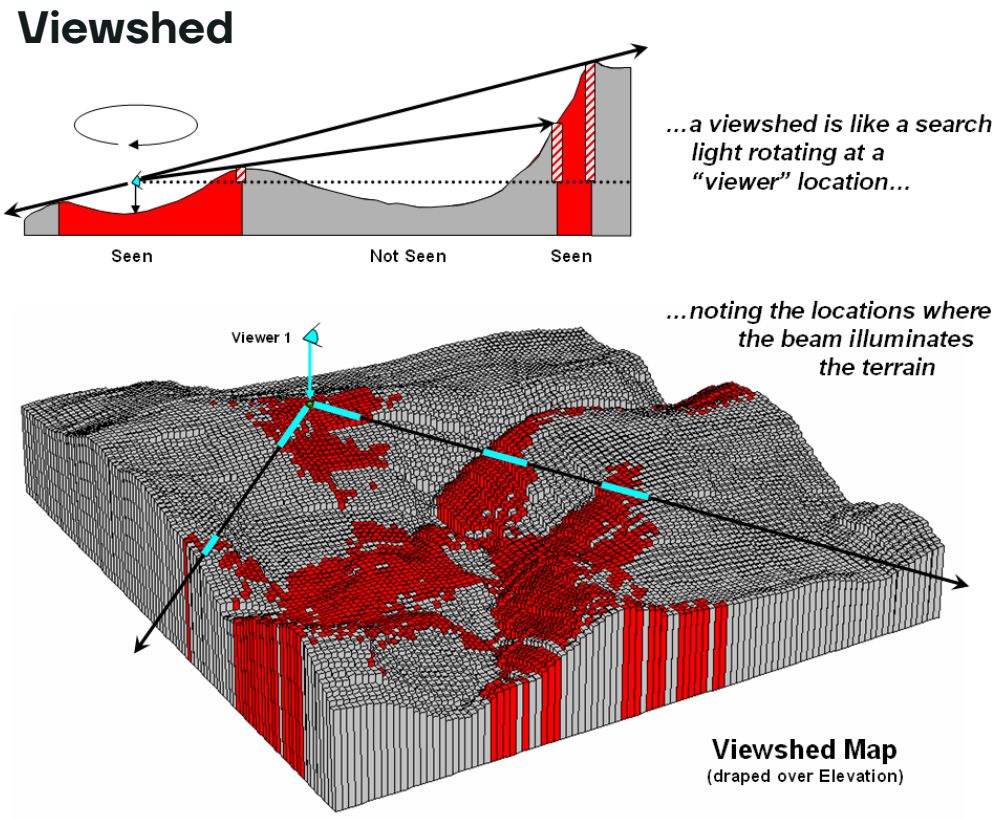
The outputs from this analysis is data and a series of maps showing visibility from proposed infrastructure and identified critical viewpoints.

A.2 Methodology

A.2.1 Viewsheds

Entura used the *Viewshed toolbox* on ArcMap from ESRI was implemented to do the main task of viewshed analysis (Figure B.2. The toolbox allows the creation of a raster layer that records sighted/unsighted cells from the observer location (i.e. observation points). It produces a realistic representation of visibility level by taking into account the earth curvature and refractivity, whilst keeping a relatively reasonable processing time. It also allows for observer and surface offsets to take into account average eye height and infrastructure heights.

FIGURE A.2 A viewshed definition



The locations that are visible from a viewer location. Line of sight analysis. Useful for cell coverage and visual exposure analysis.

From: http://www.innovativegis.com/basis/mapanalysis/Topic15/Topic15.htm

The *viewshed* analysis generates a raster image of the investigated area with integer count of observation points that can be seen from each raster cell creating a heat map of seen and unseen.

There are two datasets required for input viewshed analysis: the terrain data (digital elevation model) and observation points (proposed infrastructure or critical viewpoints).

A.2.2 Viewshed Observation Points

Viewshed observation points are points representing what can be seen, these can either be from proposed infrastructure or from critical viewpoints. Viewshed observation points need to have elevations assigned to them based on designs or specifications for proposed infrastructure or average eye height for critical observation points.

The number of observation points is determined by the size of the infrastructure or critical viewpoints and the scale of the viewshed. Larger infrastructure and larger viewshed areas require more viewpoints however, this can result in very long processing time. Viewshed observation points for proposed infrastructure and critical observation points need to be representative of the area they represent, for example:

- a proposed dam, the points need to be placed on dam walls, top of dam crest and on the surface of the dam;
- transmission lines need to take into account the width of the easement, placement and height of towers; and
- roads and walking tracks observation points need to be at regular intervals along the distance of the road or track.

To take into account average eye height the following offsets are applied to the viewshed observation points:

- proposed infrastructure observation points from have a surface offset of 1.5 meters; and
- critical viewpoints observation points have an observer offset of 1.5m.

A.2.3 Terrain Data

Two types of elevation surfaces are used in the viewshed analysis:

- ground terrain or Digital Elevation Model (DEM); and
- above ground features or Digital Surface Model (DSM), this includes surface features such as vegetation and buildings.

The DEM viewshed represents the worst-case scenario for what can be seen and is used to assess what is seen and unseen for proposed infrastructure. Viewsheds using DSM can be run in addition to the DEM to understand the impact of existing vegetation. However, DSM viewsheds need to be used with caution as they only represent a single point in time and surfaces can change dramatically in a short period of time (fires, logging, development).

The quality of the output of the viewshed is largely determined by the quality of the terrain data. The higher quality and resolution of the DEM & DSM the more reliable the output will be.

For viewshed from critical observation points the DEM and DSM need to be modified to include the proposed infrastructure:

- DEM – the proposed infrastructure is added to the DEM based on 3D design models and specifications; and
- DSM – vegetation is removed from around the proposed infrastructure and the infrastructure is added to the DSM based on 3D design models and specification. Vegetation removal includes clearance around the infrastructure, for example within easement for transmission lines and roads.

During the creation of the DSM vegetation points within 50m of the proposed dam infrastructure construction zone were removed as well as all vegetation points within a cleared easement along the new proposed transmission line path.

A.2.4 Critical Viewpoints

Critical viewpoints are identified from available datasets and where possible local knowledge. The *Viewer Sensitivity Levels for Ravel Routes and Use Areas* as cited in the Guidelines for Scenic Values Assessment – Southern Tasmanian Council[21] is used as a guideline for determining what is considered critical (Sensitivity Level 1). These critical viewpoints include but are not limited to state highways, main sealed roads, tourist routes, walking tracks, urban areas, tourism-based businesses, recreation, cultural or scenic viewpoints.

This desktop processes may miss critical viewpoints that are not documented in publicly available data or information. As such, critical viewpoints need to be verified through site visits and stakeholder engagement sessions.

A.2.5 The investigated area

The investigation area is broken up into foreground, middle ground and background, represented by 1km, 5km and 25km buffers around the proposed infrastructure. Viewshed analysis and critical viewpoints are only identified within this area.

As a general rule viewshed analysis is performed at high resolution (1m cell size) within the fore and middle ground and a lower resolution (10m cell size) within the background. This is largely determined by the size of the investigation area, available data and location of critical viewpoints.

A.3 Application and limitations

The viewshed analysis relies on the quality of the terrain data, high resolution LiDAR data will produce a more accurate results for what is seen and unseen. LiDAR can be used for both DEM and DSM analysis. Lower resolution terrain data derived from contour data needs to be used with caution and only for background analysis and can only be used for DEM analysis.

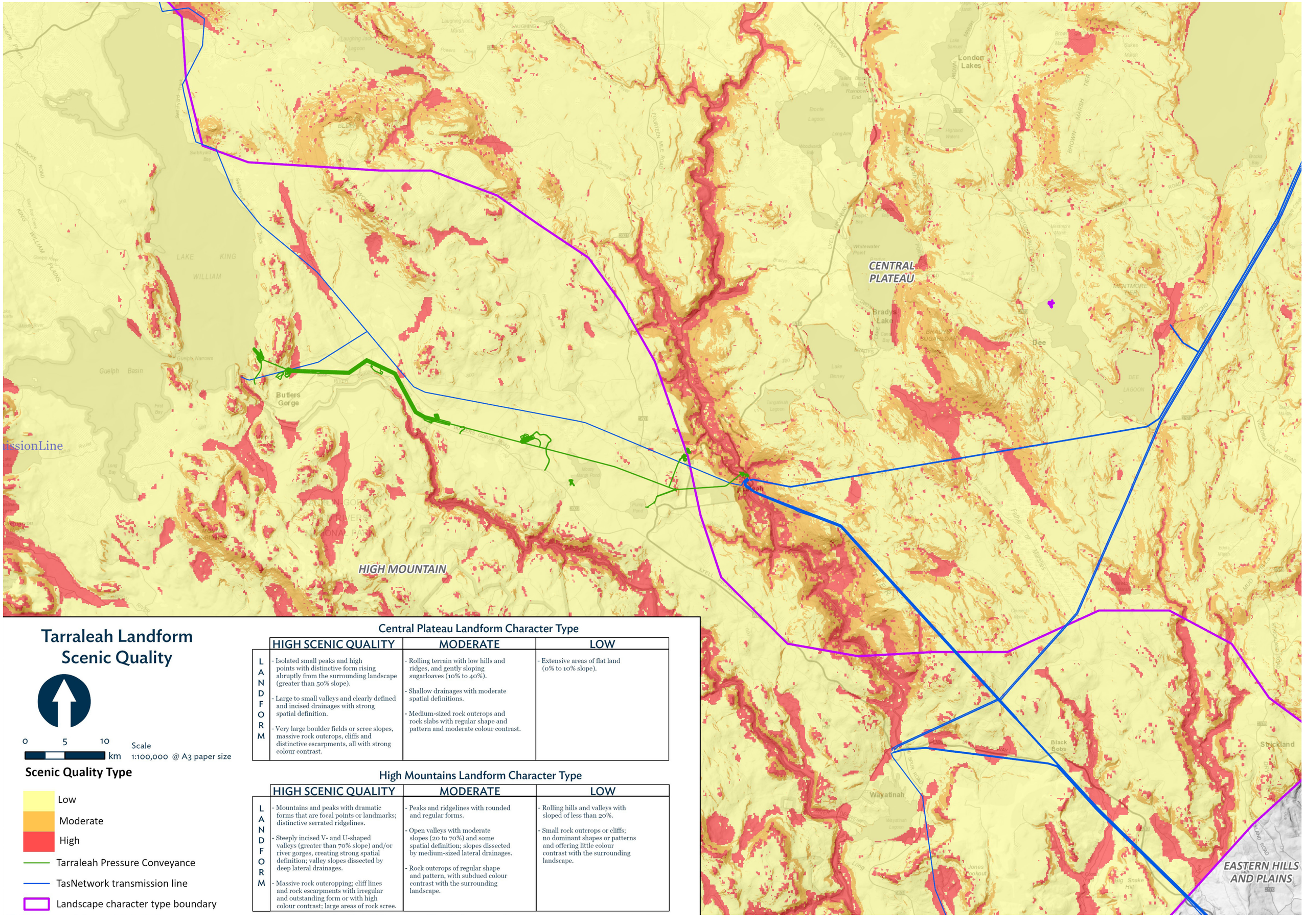
Critical viewpoints are identified through publicly available data and information, it is highly likely that some critical viewpoints will be missed. There for this data needs to be used with caution

It is intended that the viewshed analysis and critical viewpoints are used in conjunction with other visual impact assessment tools including scenic quality, stake holder engagement and site verifications.

21 Guidelines for Scenic Values Assessment – Southern Tasmanian Council

ATTACHMENT B SCENIC QUALITY ANALYSES

Source: Entura



Central Plateau Landform Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
LANDFORM	- Isolated small peaks and high points with distinctive form rising abruptly from the surrounding landscape (greater than 50% slope). - Large to small valleys and clearly defined and incised drainages with strong spatial definition. - Very large boulder fields or scree slopes, massive rock outcrops, cliffs and distinctive escarpments, all with strong colour contrast.	- Rolling terrain with low hills and ridges, and gently sloping sugarloaves (10% to 40%). - Shallow drainages with moderate spatial definitions. - Medium-sized rock outcrops and rock slabs with regular shape and pattern and moderate colour contrast.	- Extensive areas of flat land (0% to 10% slope).

High Mountains Landform Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
LANDFORM	- Mountains and peaks with dramatic forms that are focal points or landmarks; distinctive serrated ridgelines. - Steeply incised V- and U-shaped valleys (greater than 70% slope) and/or river gorges, creating strong spatial definition; valley slopes dissected by deep lateral drainages. - Massive rock outcropping; cliff lines and rock escarpments with irregular and outstanding form or with high colour contrast; large areas of rock scree.	- Peaks and ridgelines with rounded and regular forms. - Open valleys with moderate slopes (20 to 70%) and some spatial definition; slopes dissected by medium-sized lateral drainages. - Rock outcrops of regular shape and pattern, with subdued colour contrast with the surrounding landscape.	- Rolling hills and valleys with sloped of less than 20%. - Small rock outcrops or cliffs; no dominant shapes or patterns and offering little colour contrast with the surrounding landscape.

Tarraleah Vegetation Scenic Quality

0 5 10 km

Scale
1:100,000 @ A3 paper size

Scenic Quality Type

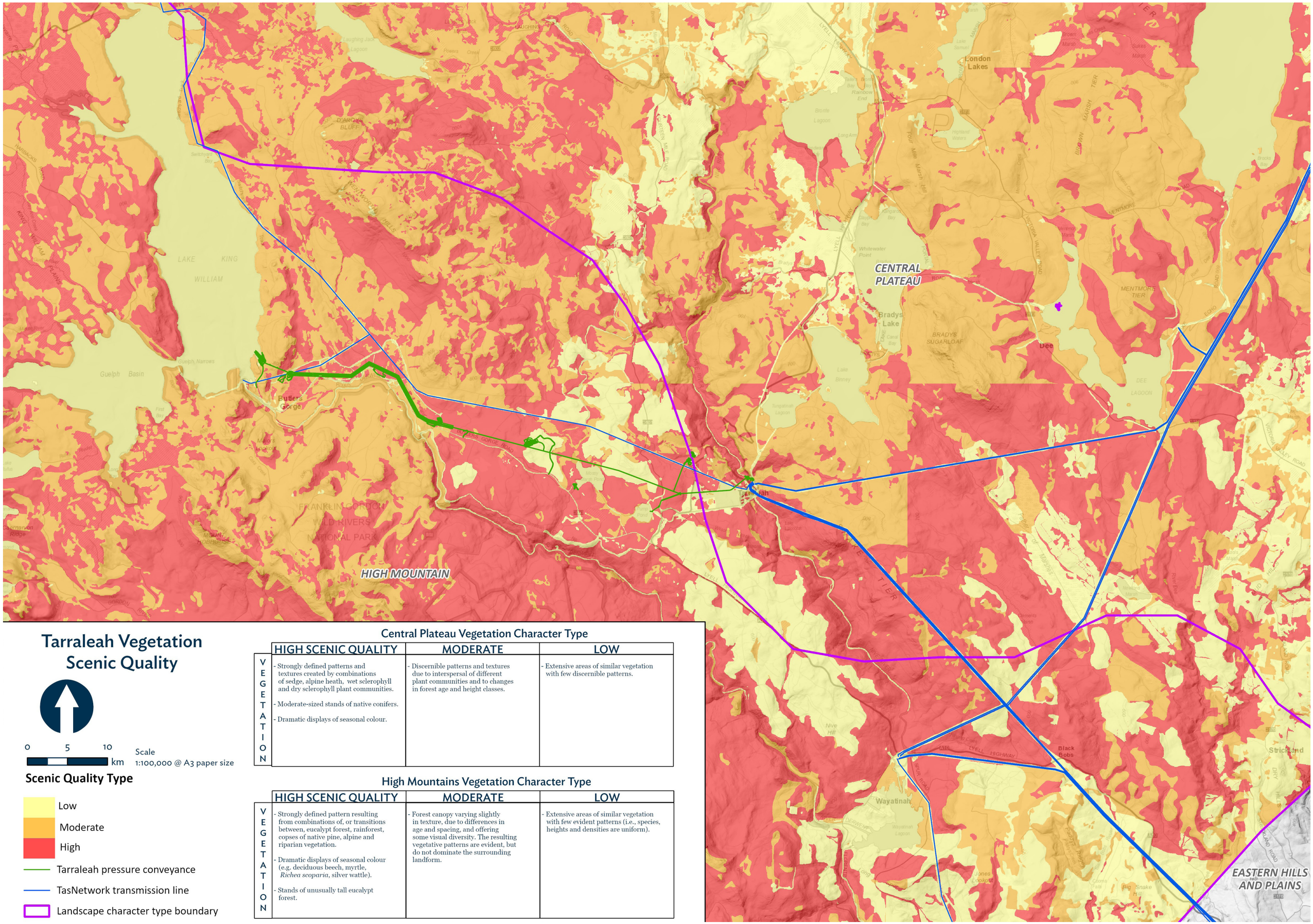
- Low
- Moderate
- High
- Tarraleah pressure conveyance
- TasNetwork transmission line
- Landscape character type boundary

Central Plateau Vegetation Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
VEGETATION	- Strongly defined patterns and textures created by combinations of sedge, alpine heath, wet sclerophyll and dry sclerophyll plant communities. - Moderate-sized stands of native conifers. - Dramatic displays of seasonal colour.	- Discernible patterns and textures due to interspersal of different plant communities and to changes in forest age and height classes.	- Extensive areas of similar vegetation with few discernible patterns.

High Mountains Vegetation Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
VEGETATION	- Strongly defined pattern resulting from combinations of, or transitions between, eucalypt forest, rainforest, copses of native pine, alpine and riparian vegetation. - Dramatic displays of seasonal colour (e.g. deciduous beech, myrtle, *Richea scoparia*, silver wattle). - Stands of unusually tall eucalypt forest.	- Forest canopy varying slightly in texture, due to differences in age and spacing, and offering some visual diversity. The resulting vegetative patterns are evident, but do not dominate the surrounding landform.	- Extensive areas of similar vegetation with few evident patterns (i.e., species, heights and densities are uniform).



Tarraleah Waterform Scenic Quality

0 5 10 km

Scale 1:100,000 @ A3 paper size

Scenic Quality Type

- Low
- Moderate
- High
- Tarraleah pressure conveyance
- TasNetwork transmission line
- Landscape character type boundary

Central Plateau Waterform Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
WATERFORM	- Major rivers and streams. - Lakes and areas with high concentrations of small tarns.	- Small streams less than 2m wide.	- Intermittent streams and shallow ponds.

High Mountains Waterform Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
WATERFORM	- Large to moderate-sized lakes, tarns and reservoirs (with naturally appearing shorelines). - Major streams subject to extreme floods at any time throughout the year - Large river rapids and waterfalls (often associated with river gorges).	- Medium to small streams with slightly incised drainages; scattered small tarns (over 5m wide).	- Small streams with slight or intermittent flow (less than 5m wide).

ATTACHMENT C FRAMES OF REFERENCE

LANDSCAPE CHARACTER FRAME OF REFERENCE: HIGH MOUNTAINS

Source: Forestry Commission 1990

7 High Mountains Landscape Character Type

	HIGH SCENIC QUALITY	MODERATE	LOW
LANDFORM	• Mountains and peaks with dramatic forms that are focal points or landmarks; distinctive serrated ridgelines. • Steeply incised V- and U-shaped valleys (greater than 70% slope) and/or river gorges, creating strong spatial definition; valley slopes dissected by deep lateral drainages. • Massive rock outcropping; cliff lines and rock escarpments with irregular and outstanding form or with high colour contrast; large areas of rock scree.	• Peaks and ridgelines with rounded and regular forms. • Open valleys with moderate slopes (20 to 70%) and some spatial definition; slopes dissected by medium-sized lateral drainages. • Rock outcrops of regular shape and pattern, with subdued colour contrast with the surrounding landscape.	• Rolling hills and valleys with slopes of less than 20%. • Small rock outcrops or cliffs; no dominant shapes or patterns and offering little colour contrast with the surrounding landscape.
VEGETATION	• Strongly defined pattern resulting from combinations of, or transitions between, eucalypt forest, rainforest, copses of native pine, alpine and riparian vegetation. • Dramatic displays of seasonal colour (e.g. deciduous beech, myrtle, *Richea scoparia*, silver wattle). • Stands of unusually tall eucalypt forest.	• Forest canopy varying slightly in texture, due to differences in age and spacing, and offering some visual diversity. The resulting vegetative patterns are evident, but do not dominate the surrounding landform.	• Extensive areas of similar vegetation with few evident patterns (i.e., species, heights and densities are uniform).
WATERFORM	• Large to moderate-sized lakes, tarns and reservoirs (with naturally appearing shorelines). • Major streams subject to extreme floods at any time throughout the year. • Large river rapids and waterfalls (often associated with river gorges).	• Medium to small streams with slightly incised drainages; scattered small tarns (over 5 m wide).	• Small streams with slight or intermittent flow (less than 5 m wide).

Table 3.2 Viewer Sensitivity Levels for Travel Routes and Use Areas[1]

SENSITIVITY LEVEL 1 (High)	**High Viewer Numbers Moderate Scenic Concerns**	▪ Freeways and State Highways with <500 vehicles/day. ▪ Main Sealed Roads with <75 vehicles/day. ▪ Interstate Passenger Rail Lines with Daily Daylight Service ▪ Urban Residential Areas
	Low to High Viewer Numbers, High to Very High Scenic Concerns	▪ Recreation, Cultural or Scenic Sites and Viewpoints of National or State Significance. ▪ Classified Tourist Roads ▪ Walking Tracks of National Significance ▪ Rail Lines of Cultural, Historic or Scenic Significance ▪ Navigable Waterways of National or State Recreation Significance ▪ Viewpoints to or from All Statutory Protected Areas under the National Reserve System (refer to Table 8) ▪ Viewpoints to or from National Heritage List Sites and Commonwealth Heritage List Sites ▪ Viewpoints to or from the following Non-Statutory Sensitive Land Use Designations: – Australian National Landscapes – National Trust Classified Landscapes – Previous Register of the National Estate (RNE) – Historic Rural Homesteads/Residences on the State or Local Government Heritage List – Rural Residences with Associated Tourism Businesses
SENSITIVITY LEVEL 2 (Moderate)	**Moderate Viewer Numbers – Moderate Scenic Concerns**	▪ Main Sealed Roads with more than 50 vehicles /day ▪ State Passenger Rail Lines with Daily Rural Town Service ▪ Roads with >35 vehicles/day, but Planned for Recreation/Tourism Promotion within 5 years
	Low-Moderate Viewer Numbers Moderate to High Scenic Concerns	▪ Rural Residences (without Historic/Cultural or Associated Tourism Businesses) ▪ Recreation, Cultural or Scenic Sites and Viewpoints of Regional or Local Significance ▪ Navigable Waterways of National or State Recreation Significance ▪ Walking Tracks of Regional or High Local Significance ▪ Viewpoints to or within other Non-Statutory Scenic or Natural Reserves of Local or Regional Significance
SENSITIVITY LEVEL 3 (Low)	**Low Viewer Numbers Moderate Scenic Concerns**	▪ Land Management Roads with Occasional Recreation Traffic up to 10 vehicles/day ▪ Walking Tracks of Moderate Local Significance ▪ State Passenger Rail Lines with Less than Daily Rural Town Service
	Low Viewer Numbers Low to Moderate Scenic Concerns	▪ Land Management Roads with Infrequent Recreation Traffic ▪ Walking Tracks with Infrequent Recreation Usage ▪ Other Low use and Low Concern Viewpoints and Travel Routes

[1] Source: Scenic Spectrums Pty Ltd, adapted from Williamson, Dennis and Calder, Stuart, 1979. Visual Resource Management of Victoria's Forests: A New Concept for Australia

Source: Scenic Spectrums Pty Ltd

SCENIC INTEREST FRAME OF REFERENCE

Source: Forestry Commission 1990

High Scenic Interest	Moderate Scenic Interest	Low Scenic Interest
Industrial estates which appear highly ordered, with strong unity of purpose and which are well maintained particularly in contrast to a powerful landscape setting (e.g **Woolnorth wind farm, Middelgrunden offshore wind farm, Denmark**) High technology industries where the activity is expressed in its architecture or surrounds (**solar furnace, Laguardia Airport TWA terminal**) Strong contrasting industrial forms of an immense scale expressed through colour or linking elements (conveyors, piping, night lighting, etc.) (e.g. Pasminco EZ zinc works, **River Rouge Ford Plant, large scale oil refinery**) Large scale industrial elements with a strong 'industrial' design expressing function (**Telstra tower, Canberra**) Large scale utilitarian features exhibiting a modernist design aesthetic of simple geometry, clean lines and raw material finishes, with the form expressive of its function (e.g. Gordon River Dam, **power station cooling towers**) (particularly where the utilitarian, human created element is in stark contrast to a natural setting (e.g. **Hoover Dam**, Gordon River Dam).	Large scale industrial elements with a strong utilitarian design (e.g. **groupings of penstocks, wind turbine(s), container port or other** large scale lifting cranes, **spillways**) Moderate scale industrial buildings with strong unified forms and a readily apparent design ethos (e.g. **Tarraleah Generator Building, Pump Station at Pump House Point, heritage sub-stations, some power stations**) Complex clusters of industrial elements of multiple forms but lacking in legibility (i.e. the uninformed viewer does not have the capacity to understand the workings of the activity but responds to the complexity) (e.g. **large electrical substation, Tarraleah Power Station**)	Scattered buildings of limited architectural character and/or scale (e.g. light industrial buildings, aluminum **and tilt up concrete sheds**) Disturbed open storage areas lacking apparent organization or scale (e.g. temporary construction materials set down areas) Large monolithic stockpiles of industrial materials or wastes (e.g. wood chip piles, **fuel or water storage tanks**, excavation spoils) Common industrial elements (e.g. **common electricity transmission towers, small switchyards, steel or plastic electrical turrets/ transformers**) Linear features without topographic or alignment relief and/or with multiple repetitive, low scenic interest elements (e.g. **electrical transmission corridors, some canals**)

F1 Telstra Tower, Canberra – strong industrial design form that expresses its function

F2 Middelgrunden Wind Farm, Denmark – highly ordered, with a strong unity of purpose in contrast to its powerful landscape setting

F3 Laguardia TWA Terminal, New York – air flight, a high technology industry as expressed in the architecture of the TWA terminal

F4 Gordon River Dam - a modernist design aesthetic of simple geometry, clean lines and raw material finishes, with the form expressive of its function

F5 Oil refinery, Alberta, Canada - strong contrasting industrial forms of an immense scale expressed through inking elements such as pipework and lighting

F1

F2

F3

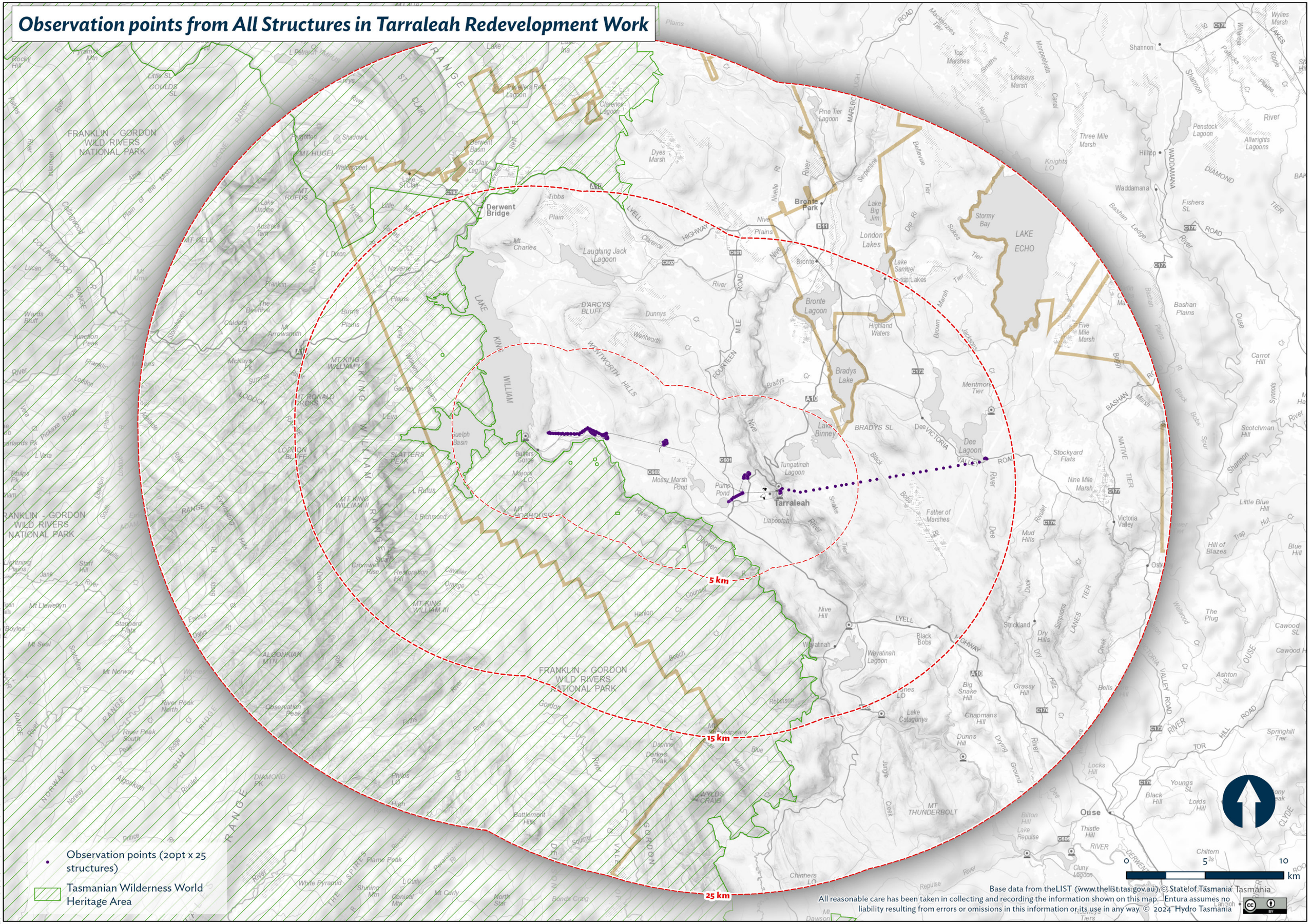
F4

F5

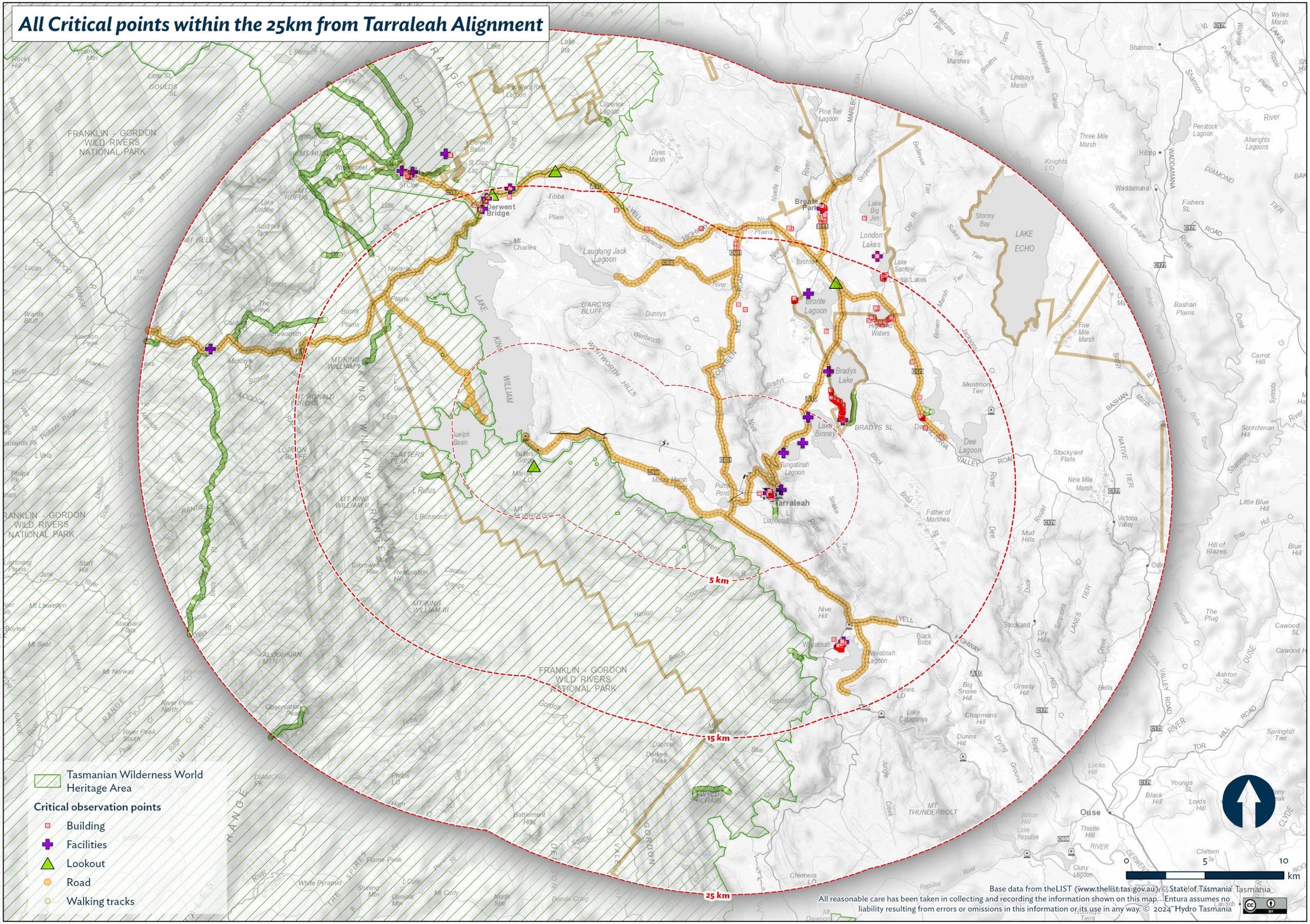
ATTACHMENT D SEEN VIEW ANALYSES

Source: Entura

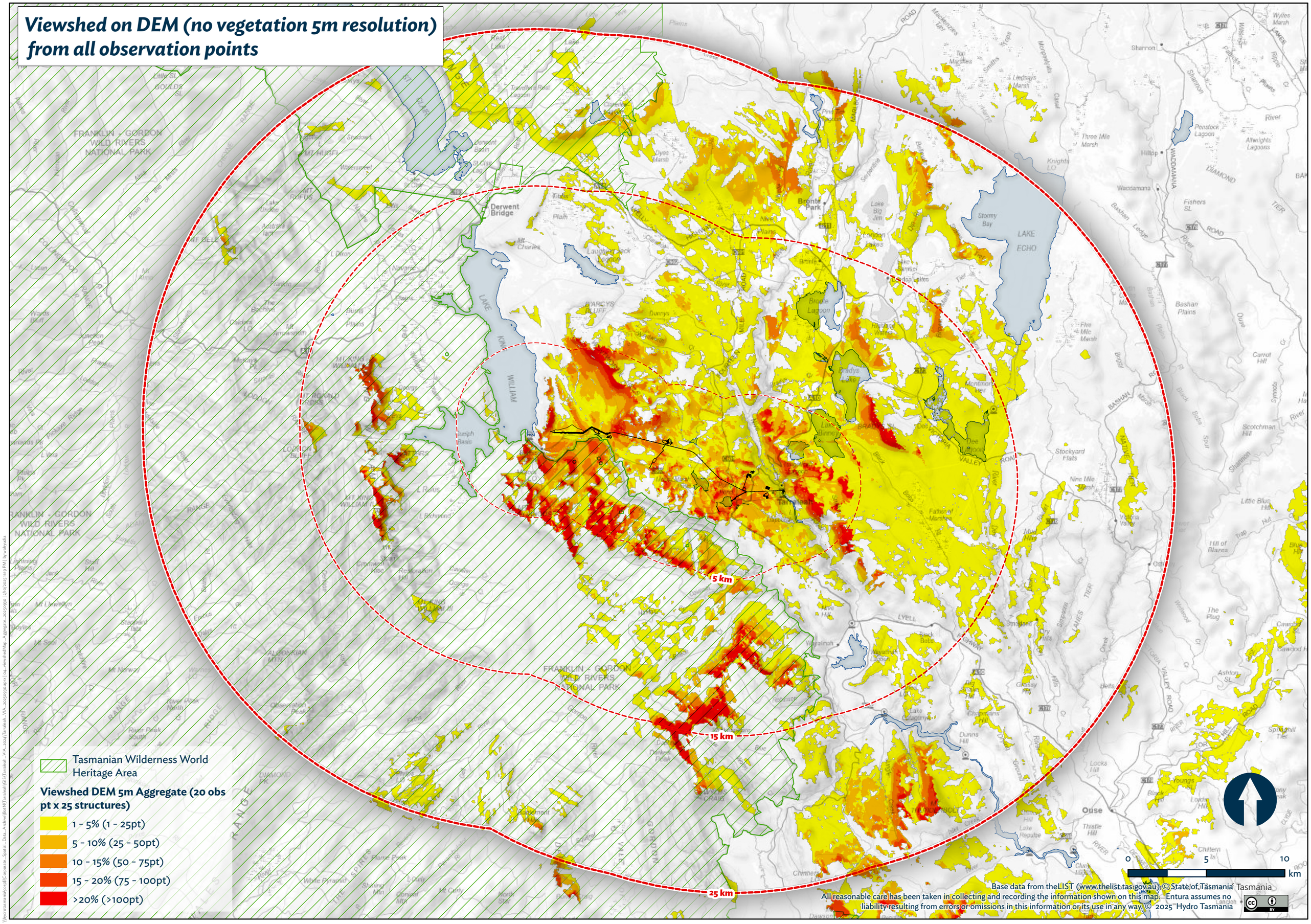
Observation points from All Structures in Tarraleah Redevelopment Work



All Critical points within the 25km from Tarraleah Alignment



Viewshed on DEM (no vegetation 5m resolution) from all observation points



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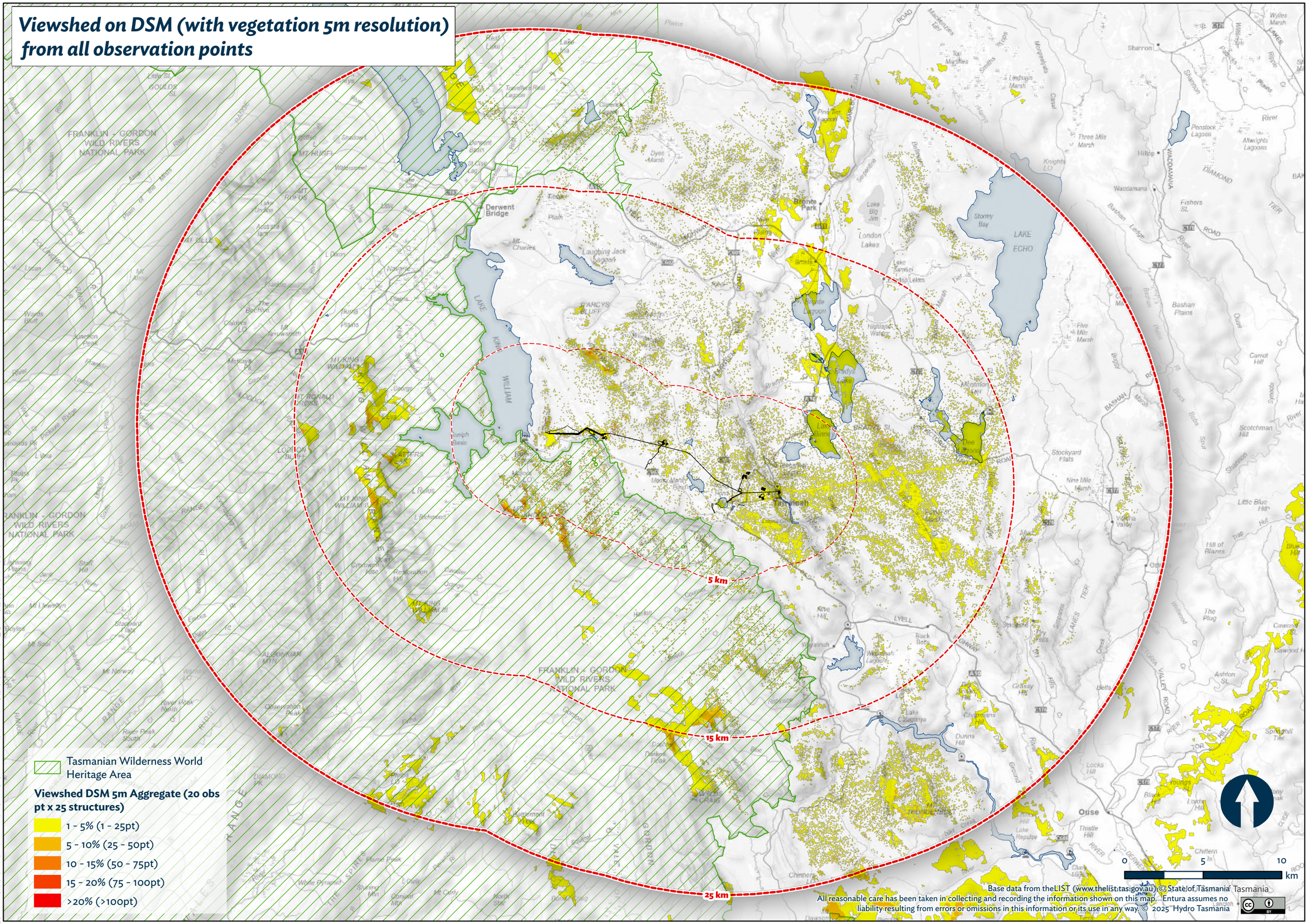
Viewshed on DSM (with vegetation 5m resolution) from all observation points



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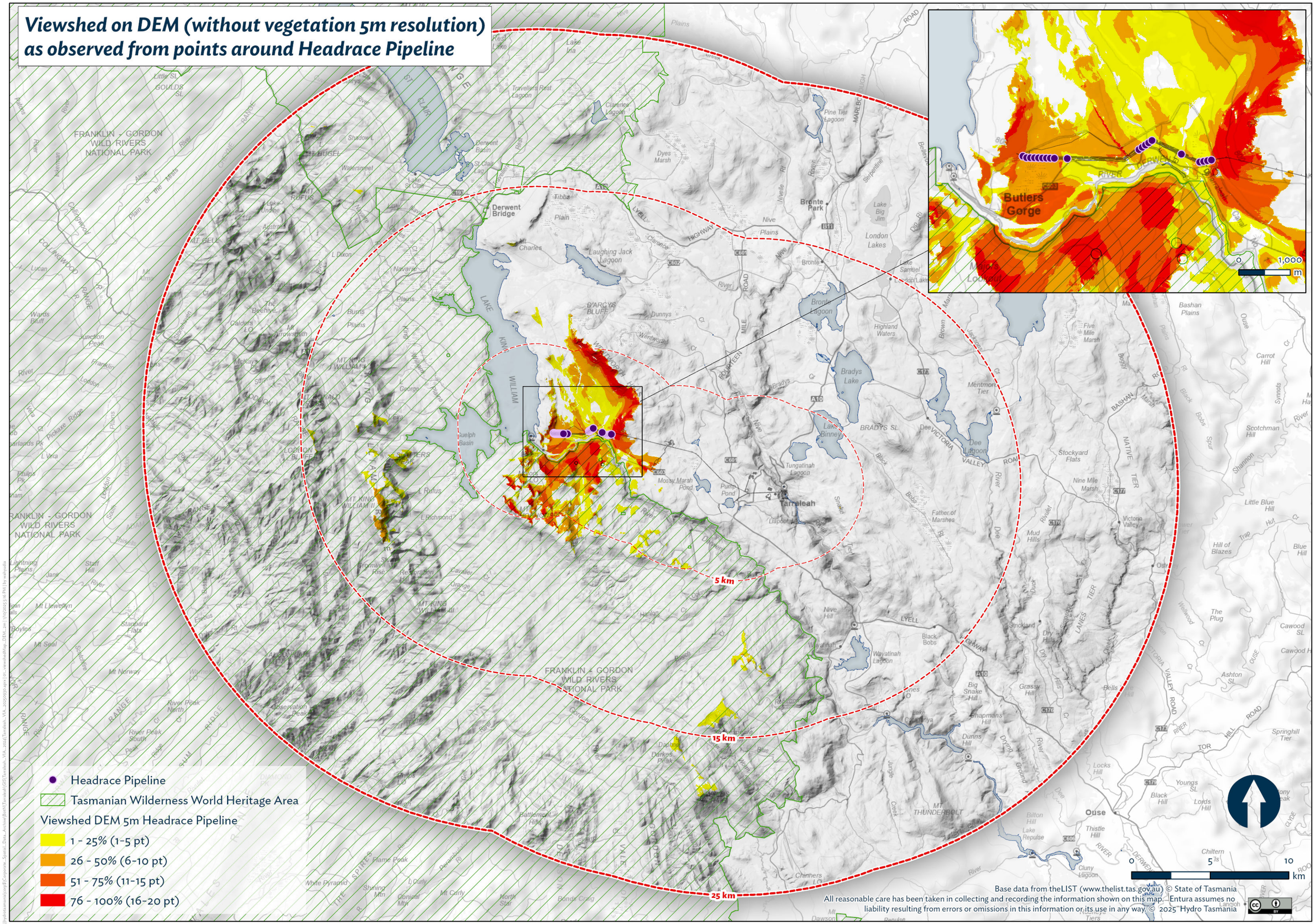
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Pipeline



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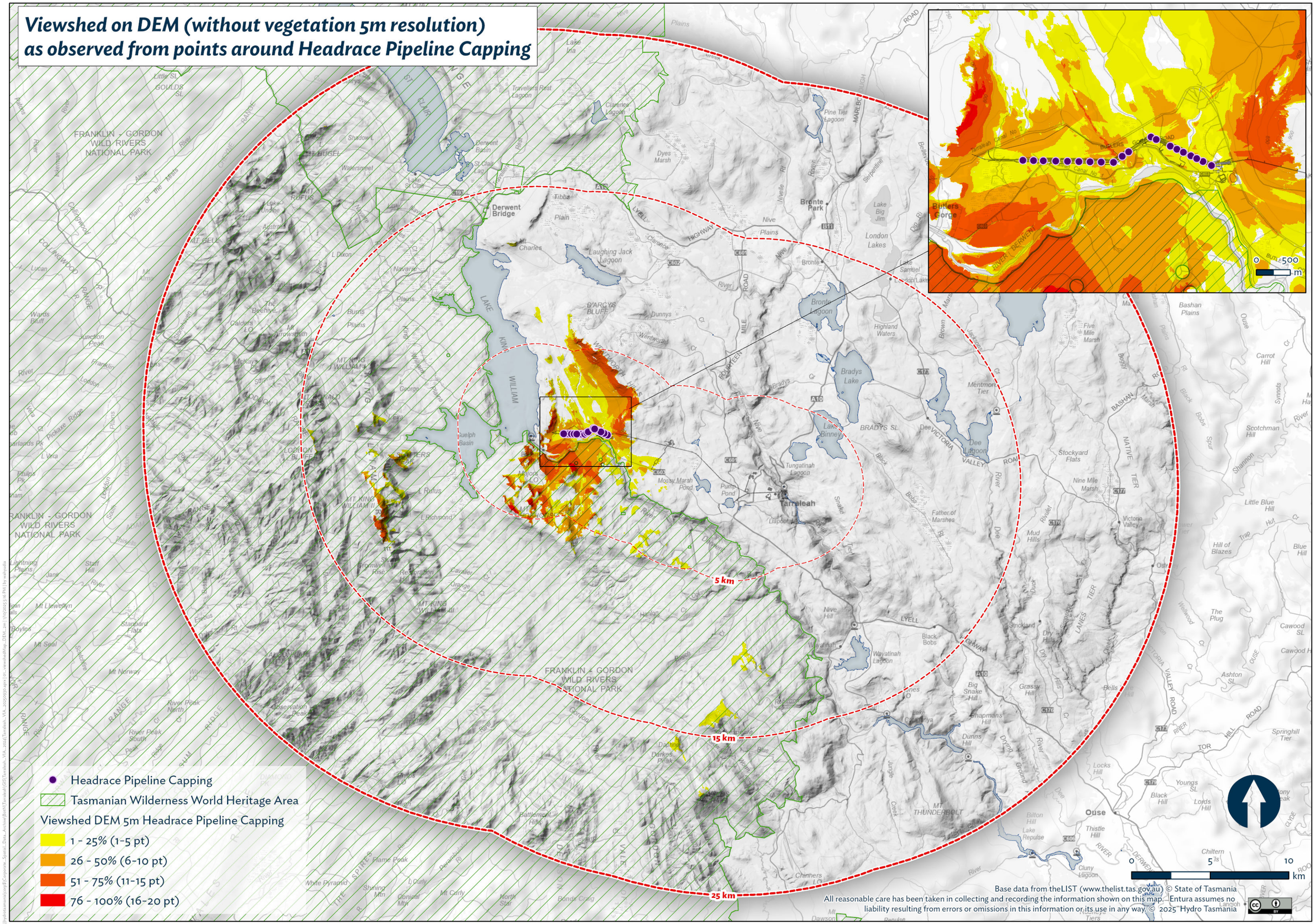
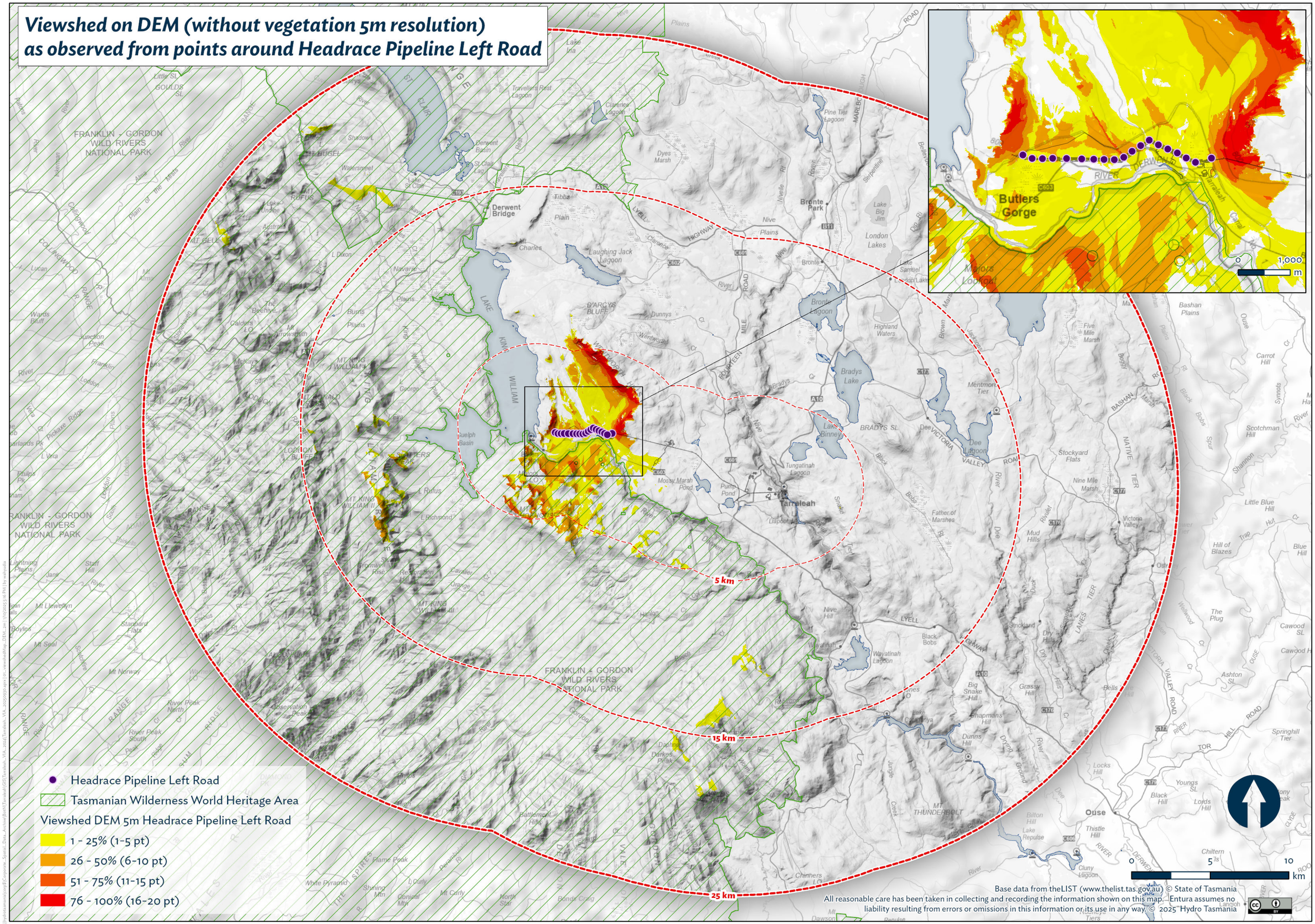
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Pipeline Capping



Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Pipeline Left Road



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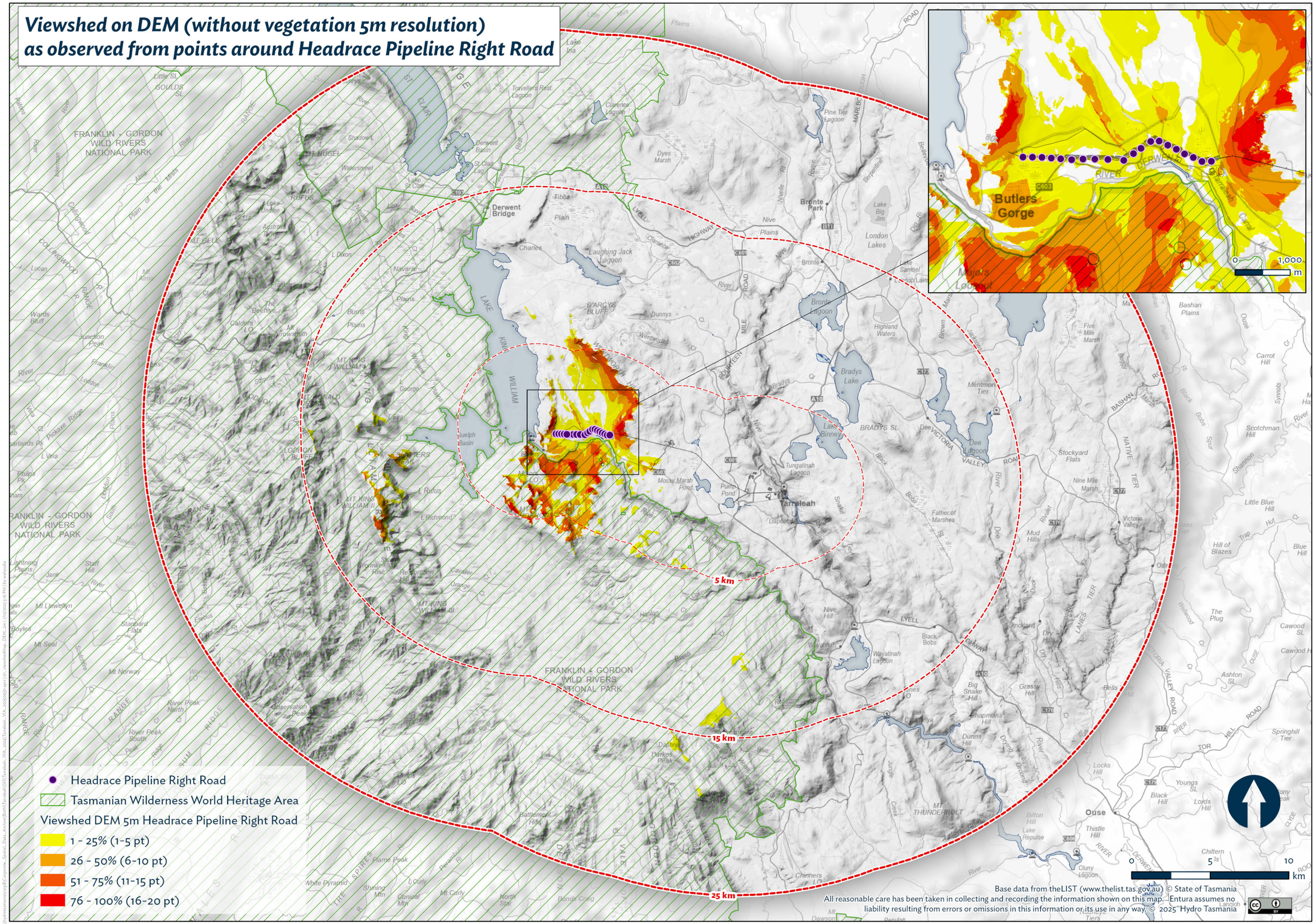
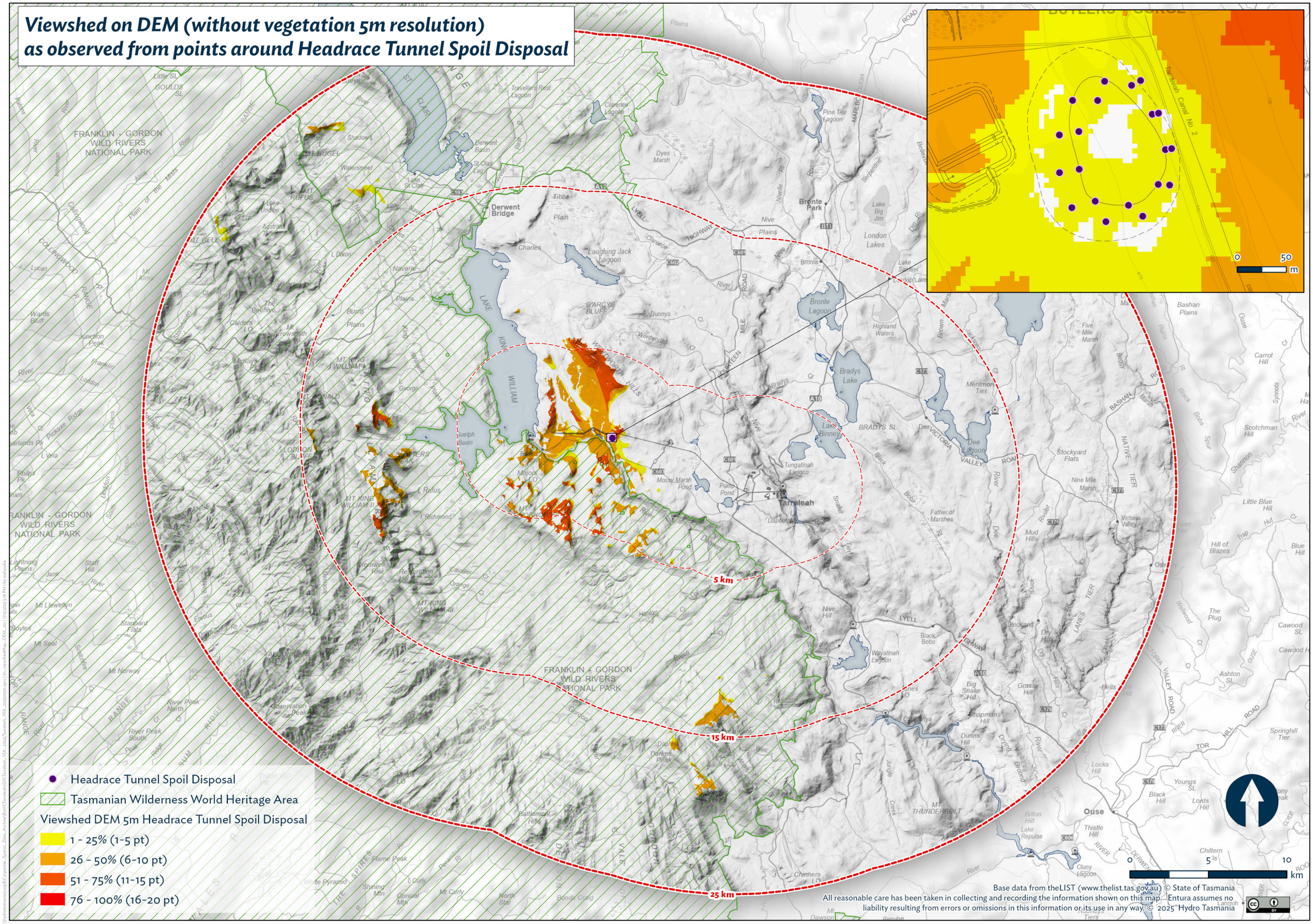
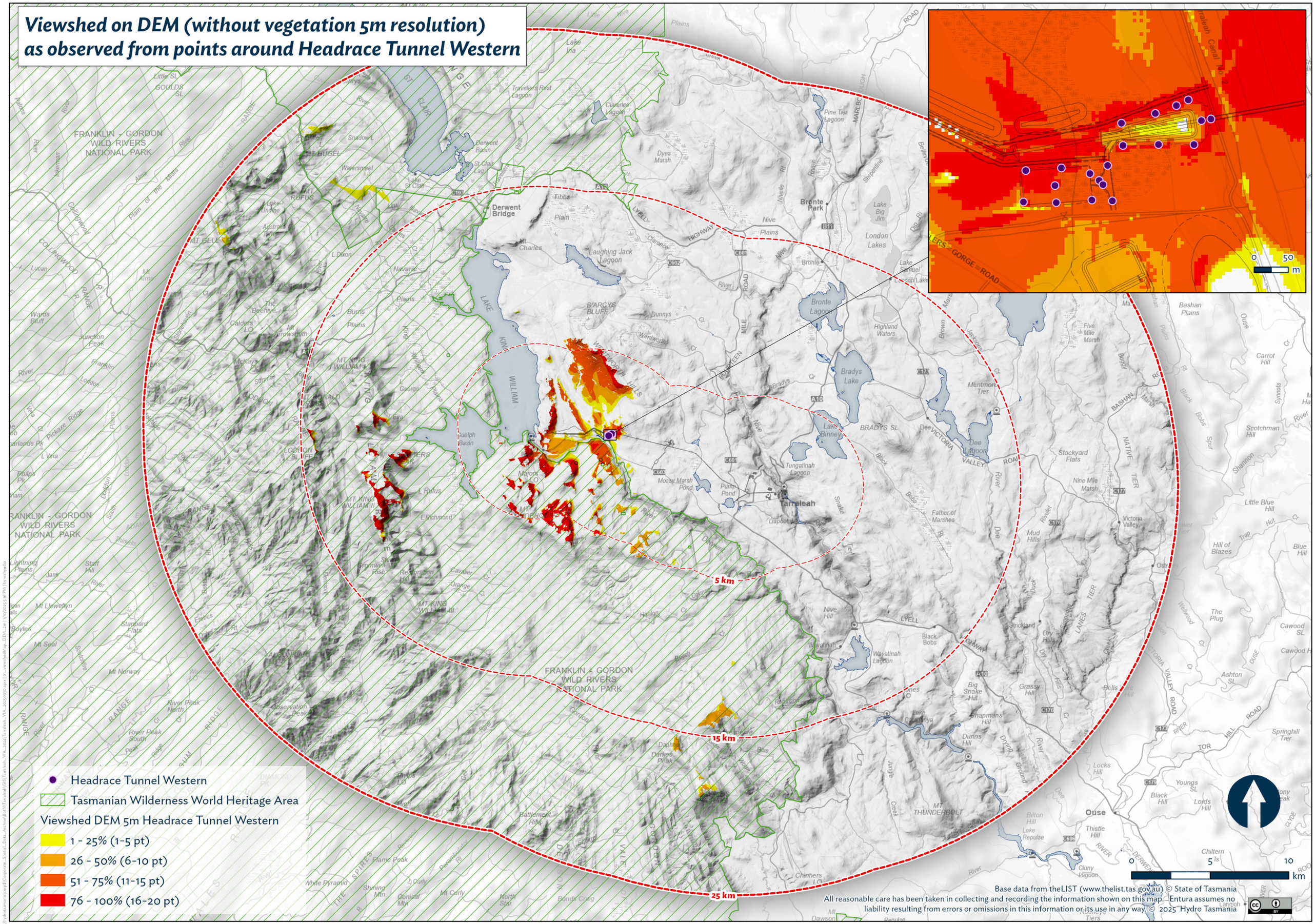
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Pipeline Right Road



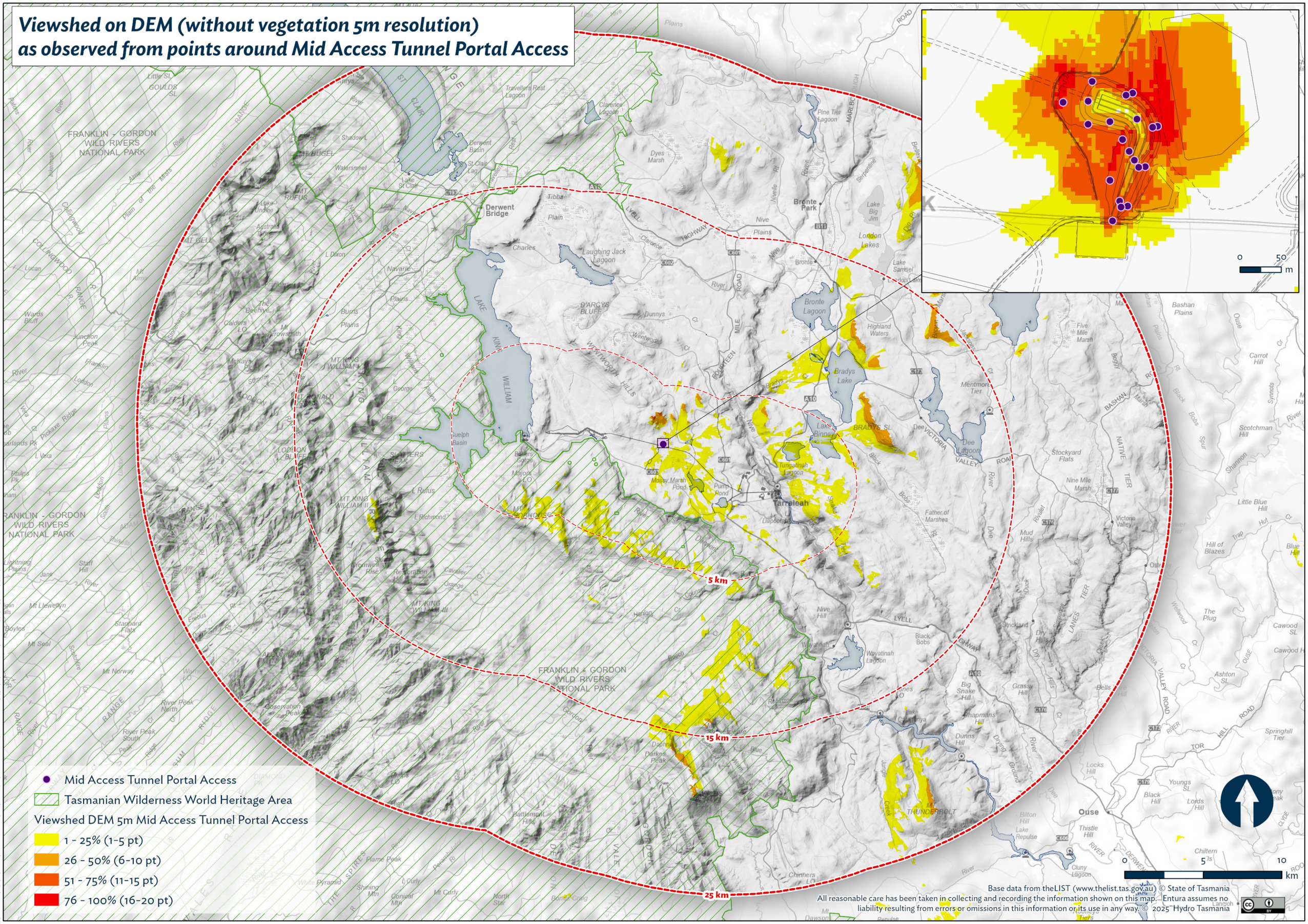
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Tunnel Spoil Disposal



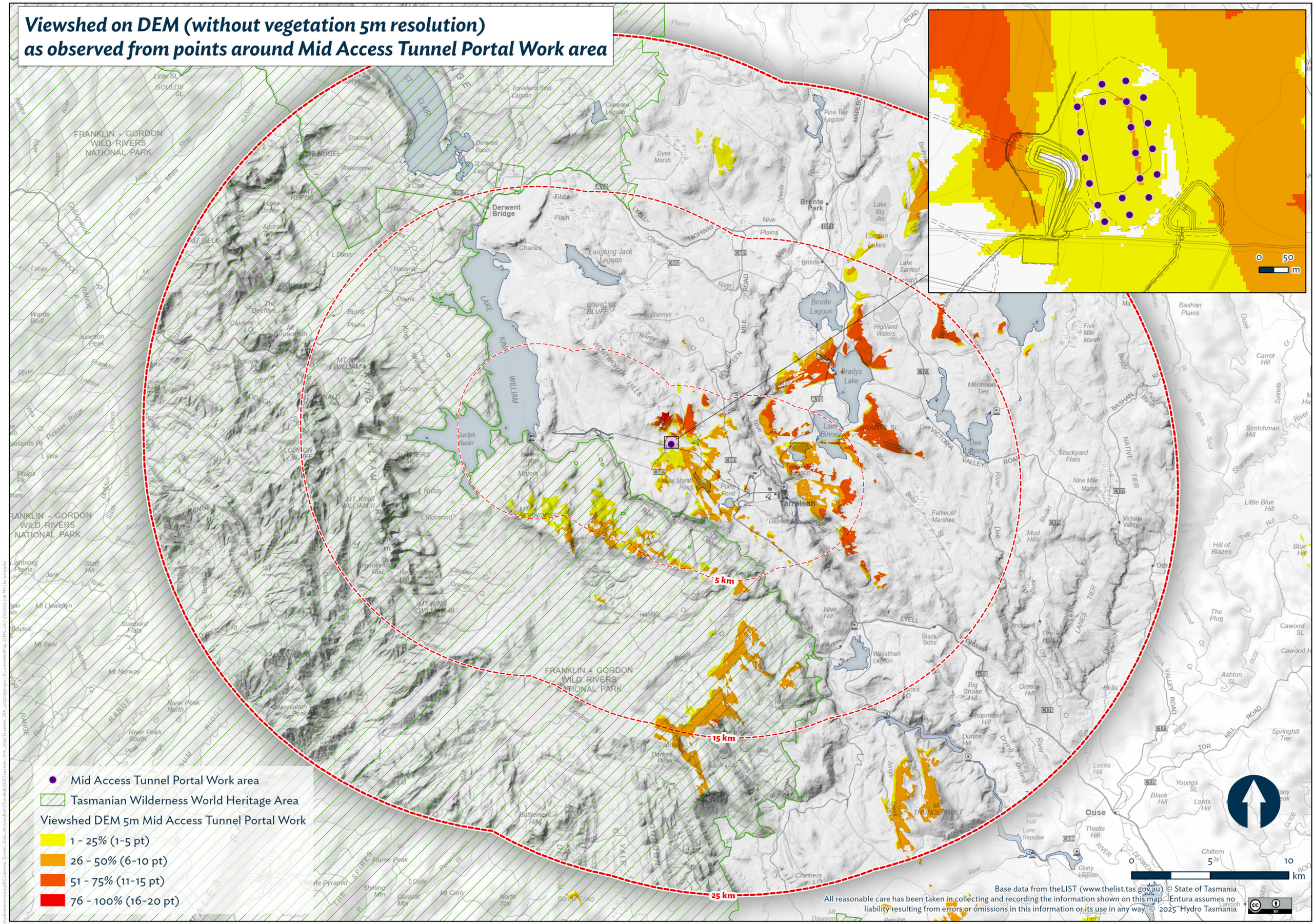
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Headrace Tunnel Western



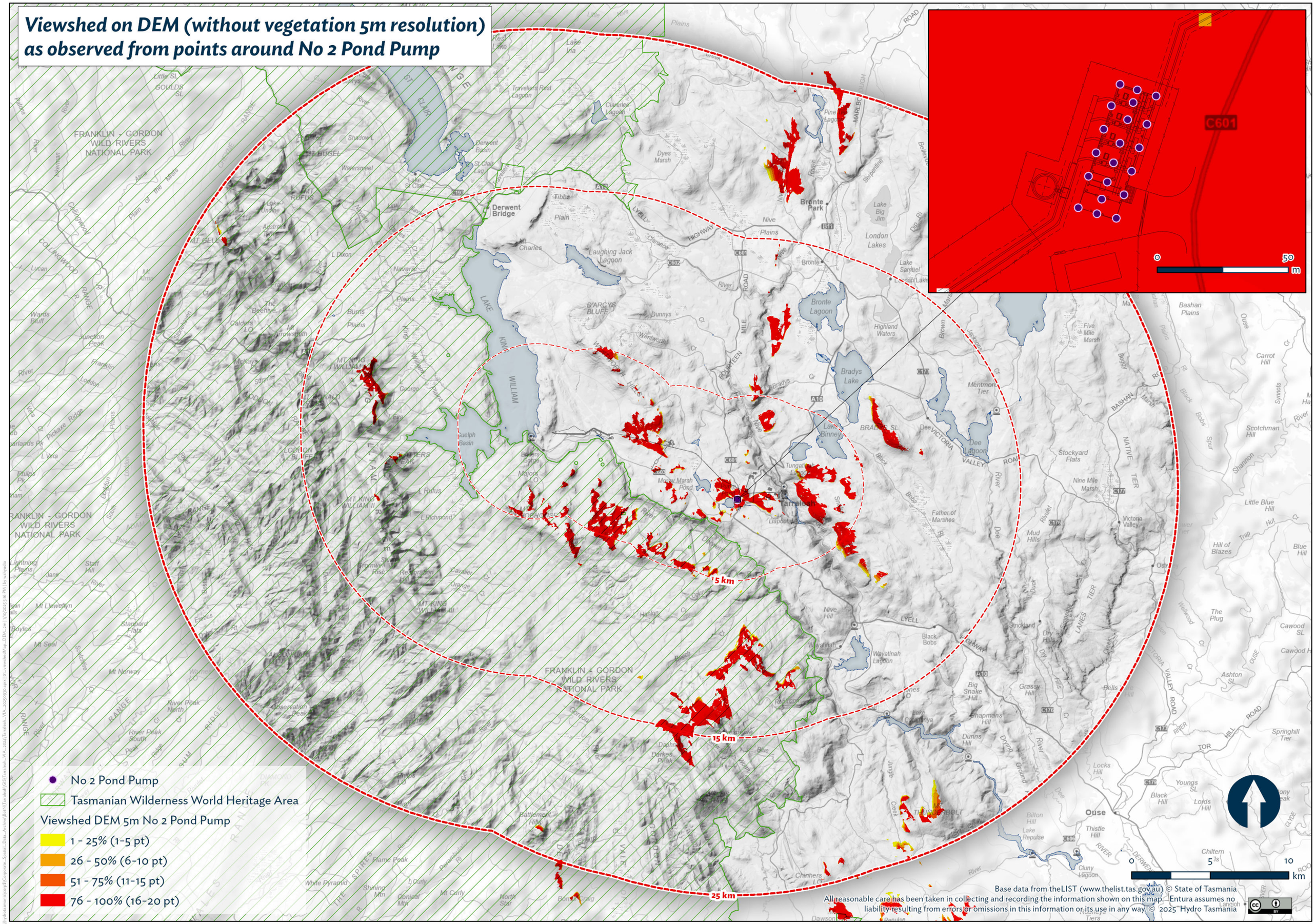
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Mid Access Tunnel Portal Access



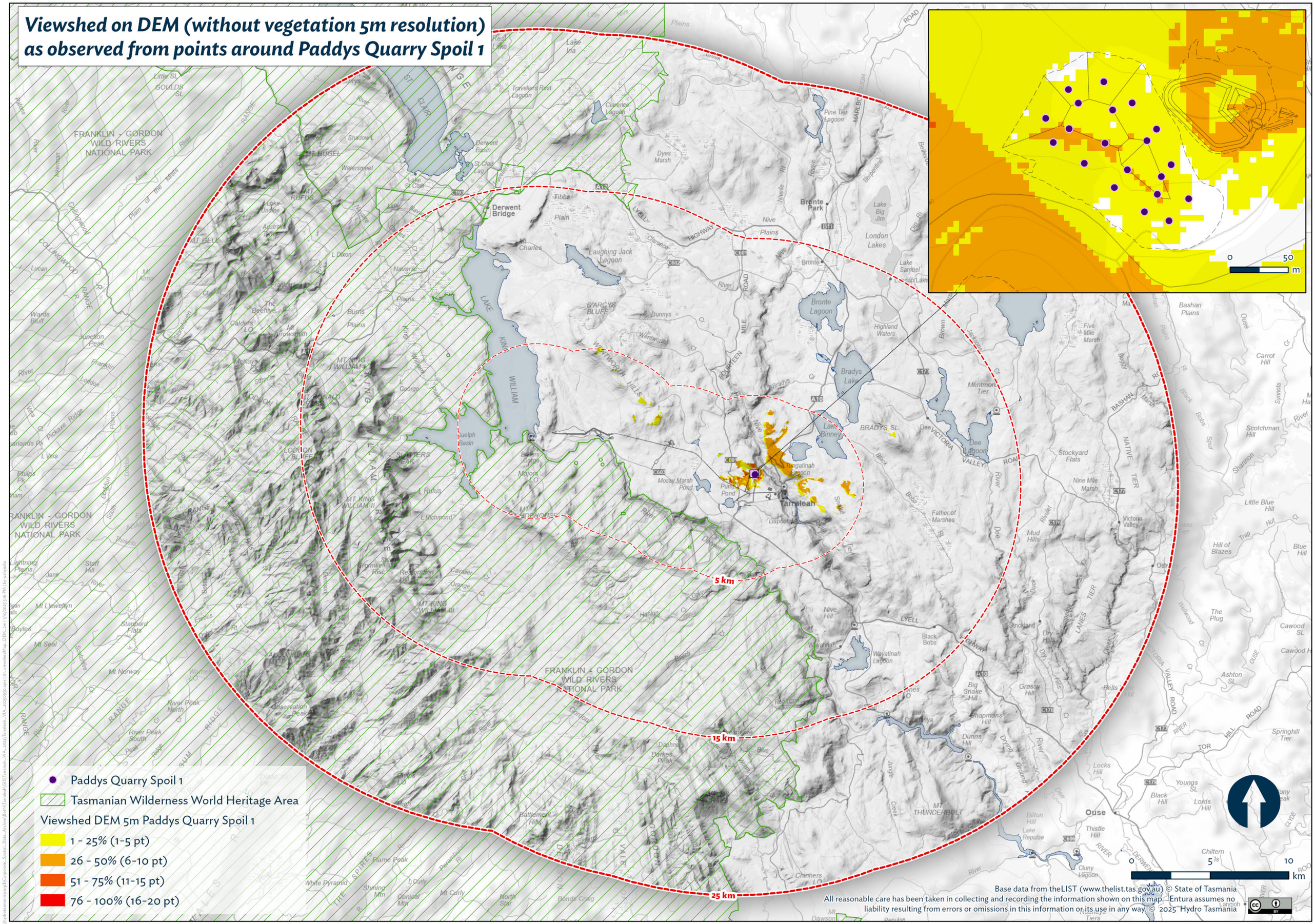
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Mid Access Tunnel Portal Work area



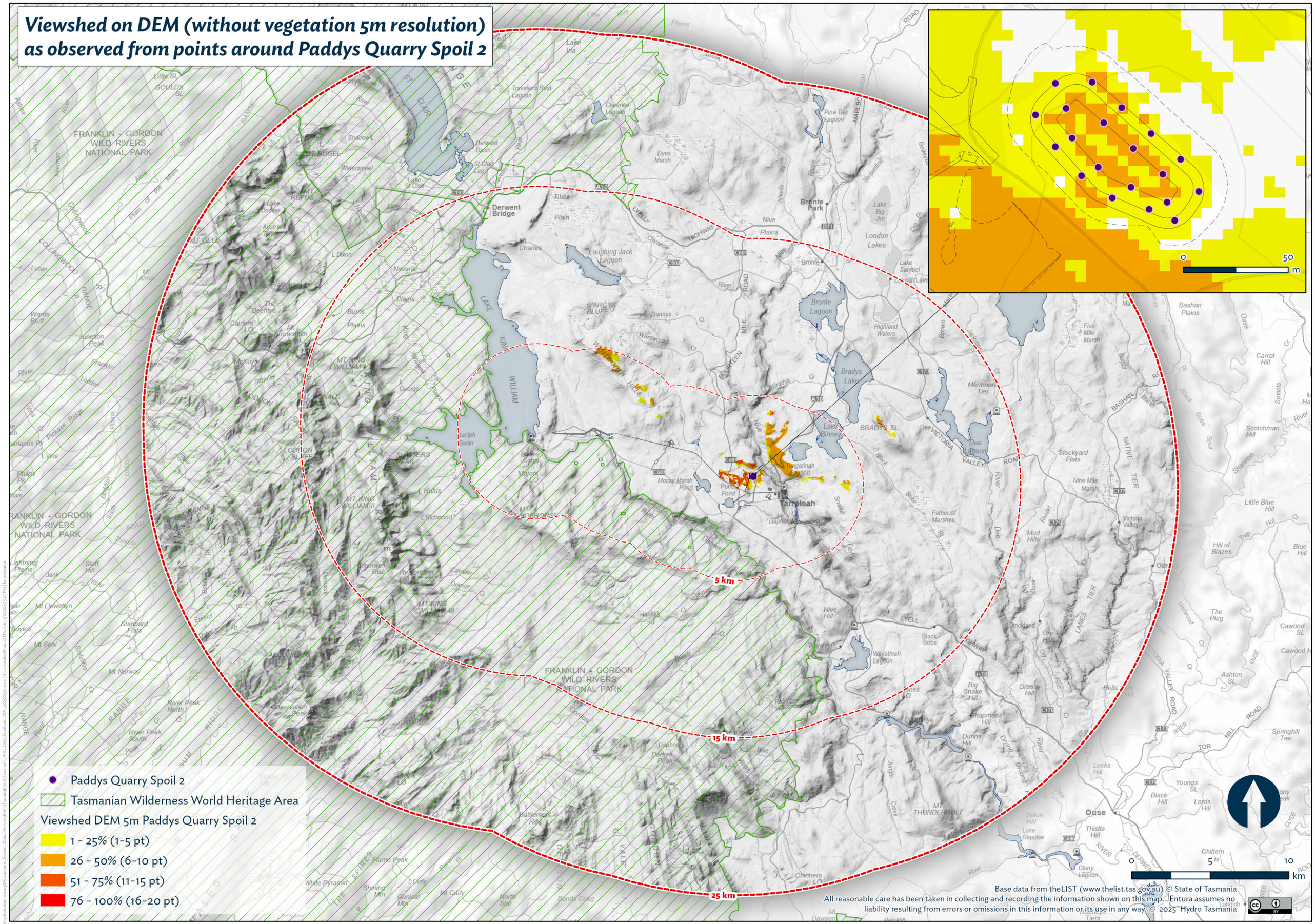
Viewshed on DEM (without vegetation 5m resolution) as observed from points around No 2 Pond Pump



Viewshed on DEM (without vegetation 5m resolution) as observed from points around Paddys Quarry Spoil 1



Viewshed on DEM (without vegetation 5m resolution) as observed from points around Paddys Quarry Spoil 2



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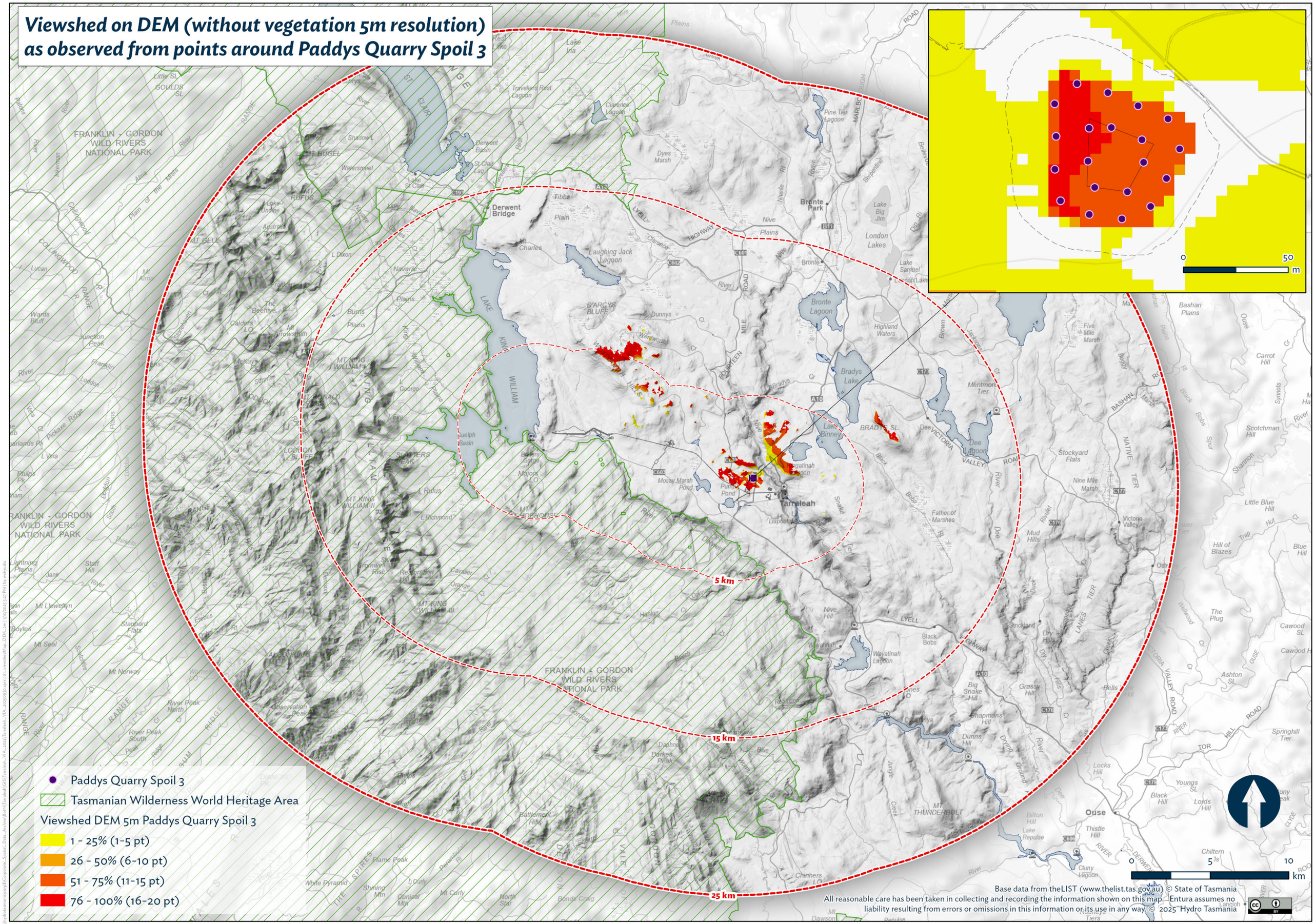
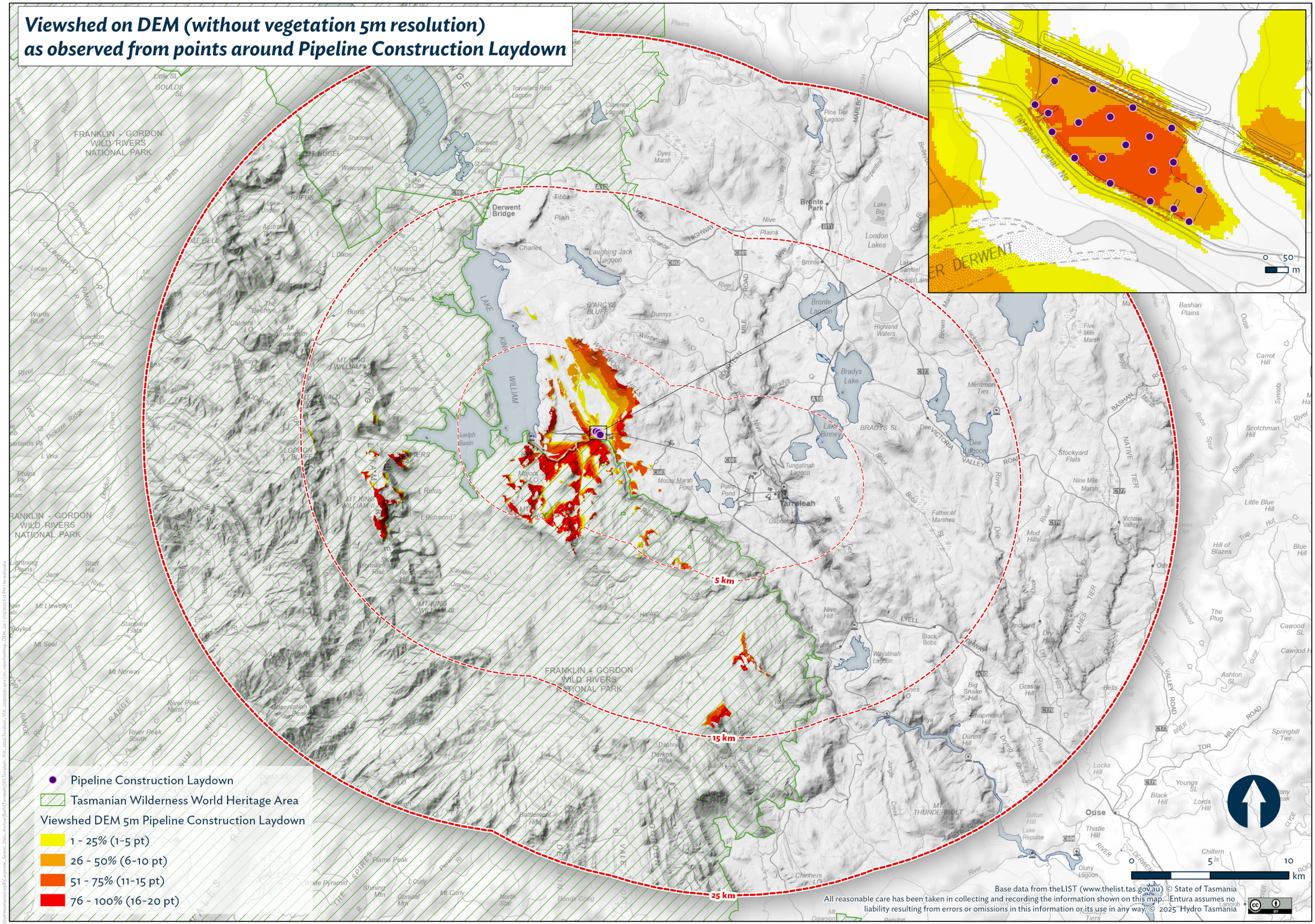
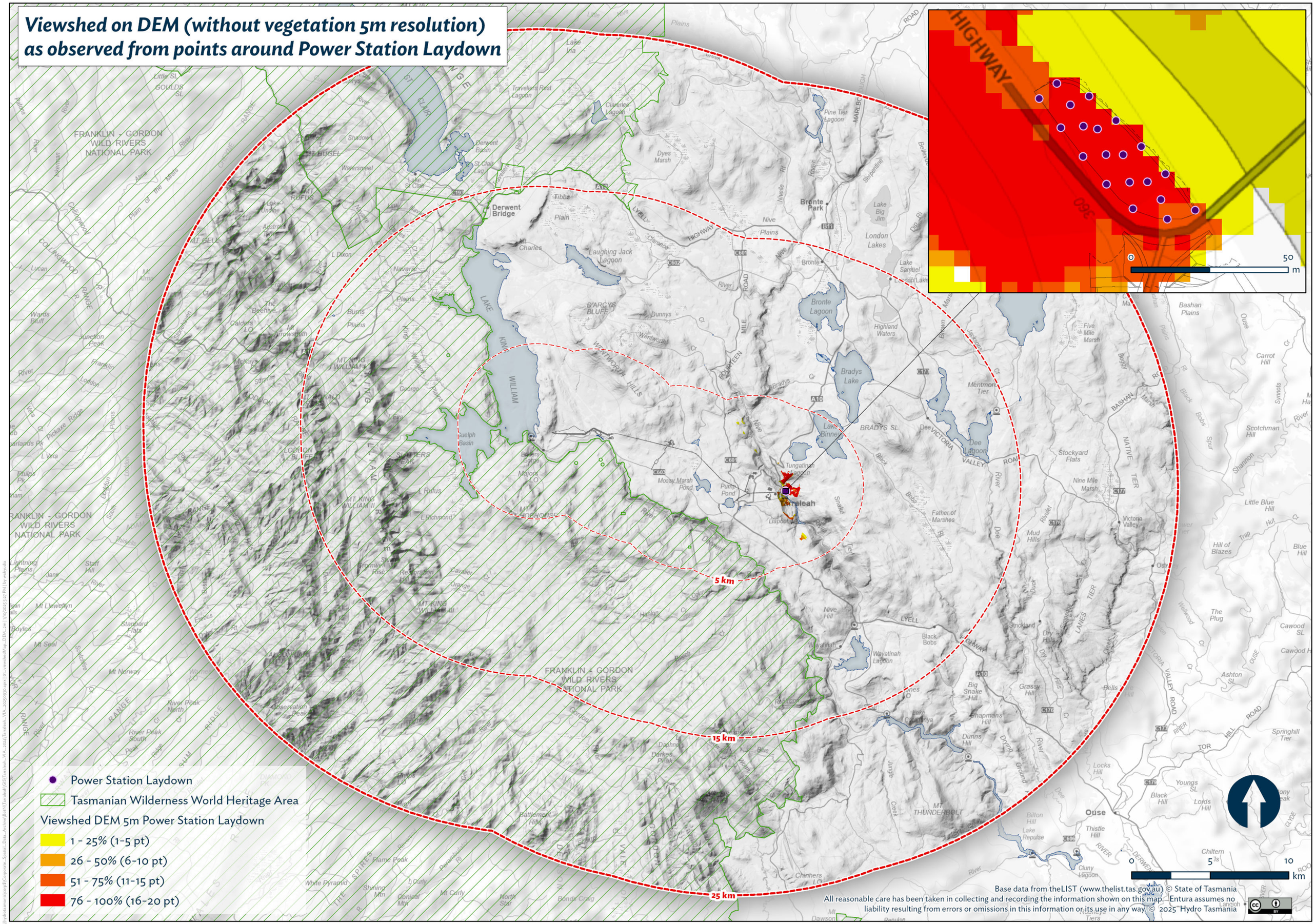


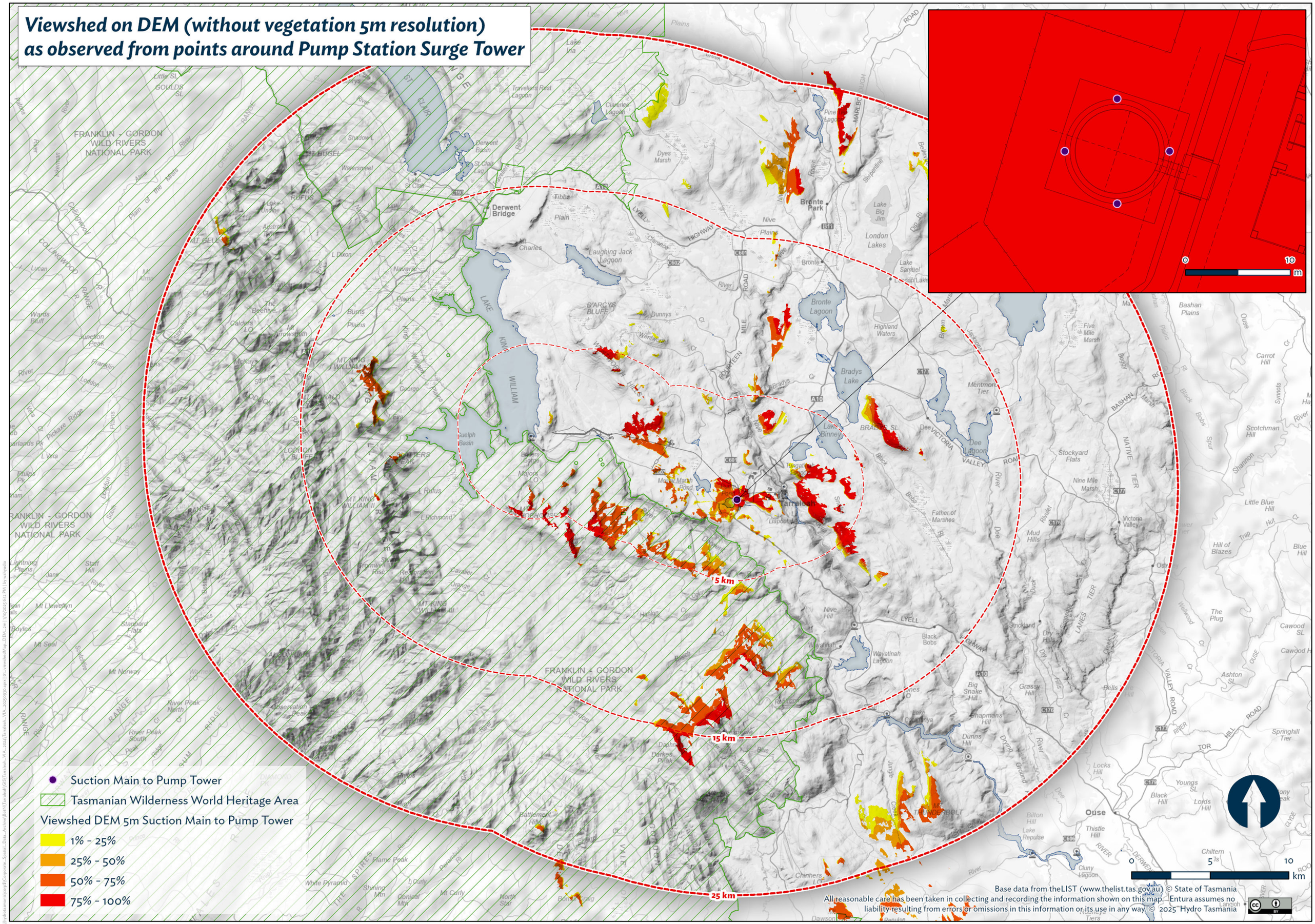
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Pipeline Construction Laydown



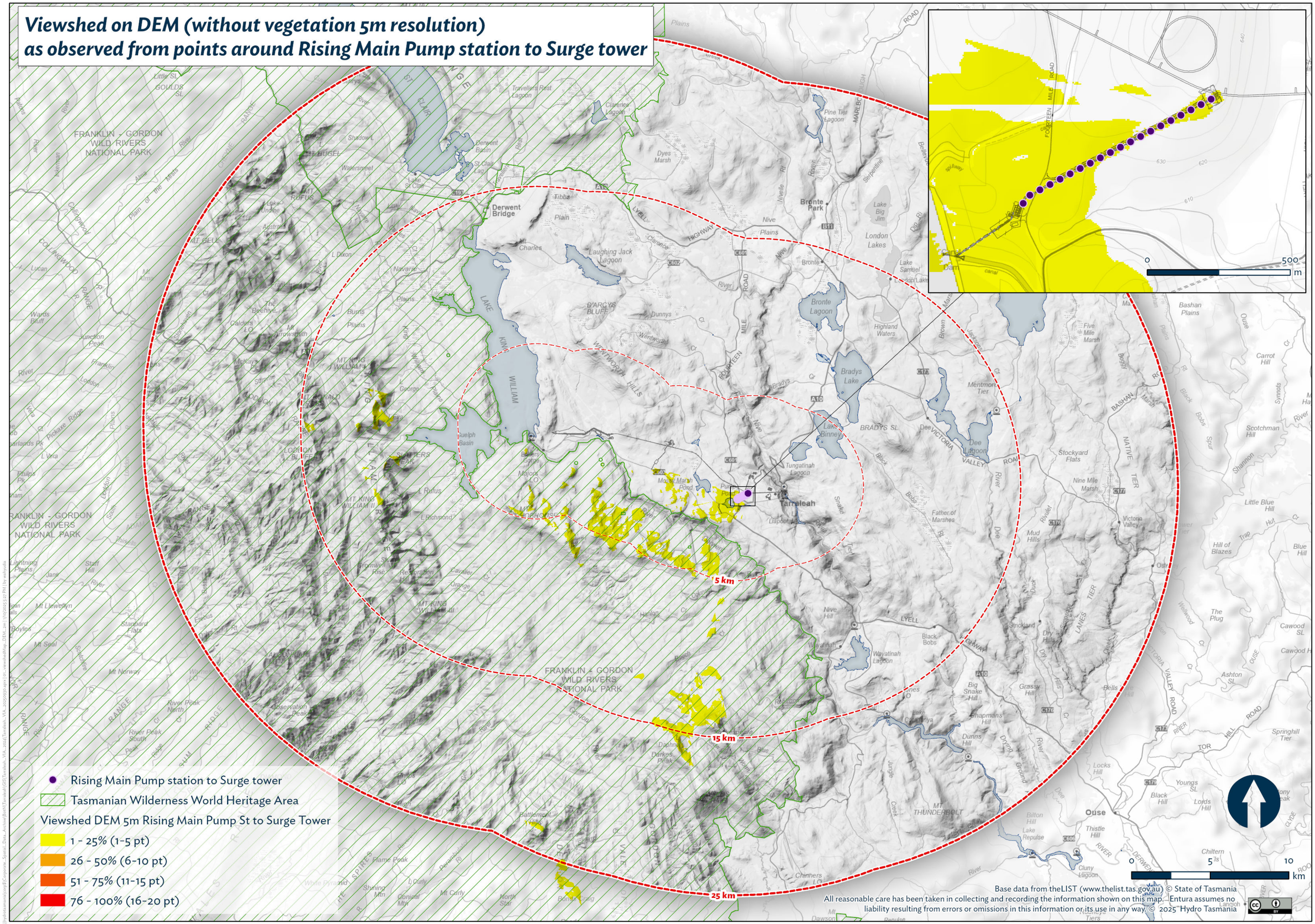
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Power Station Laydown



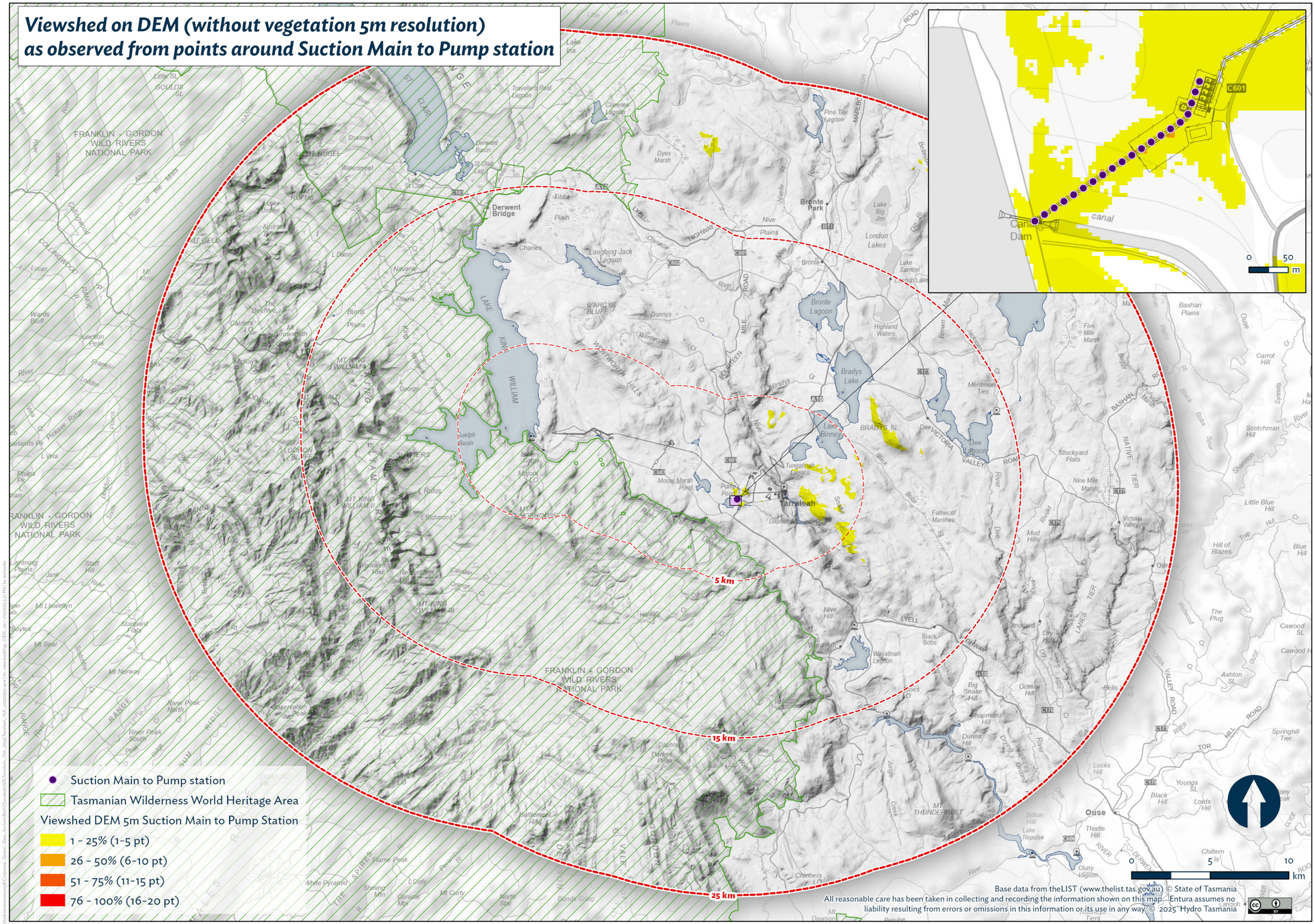
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Pump Station Surge Tower



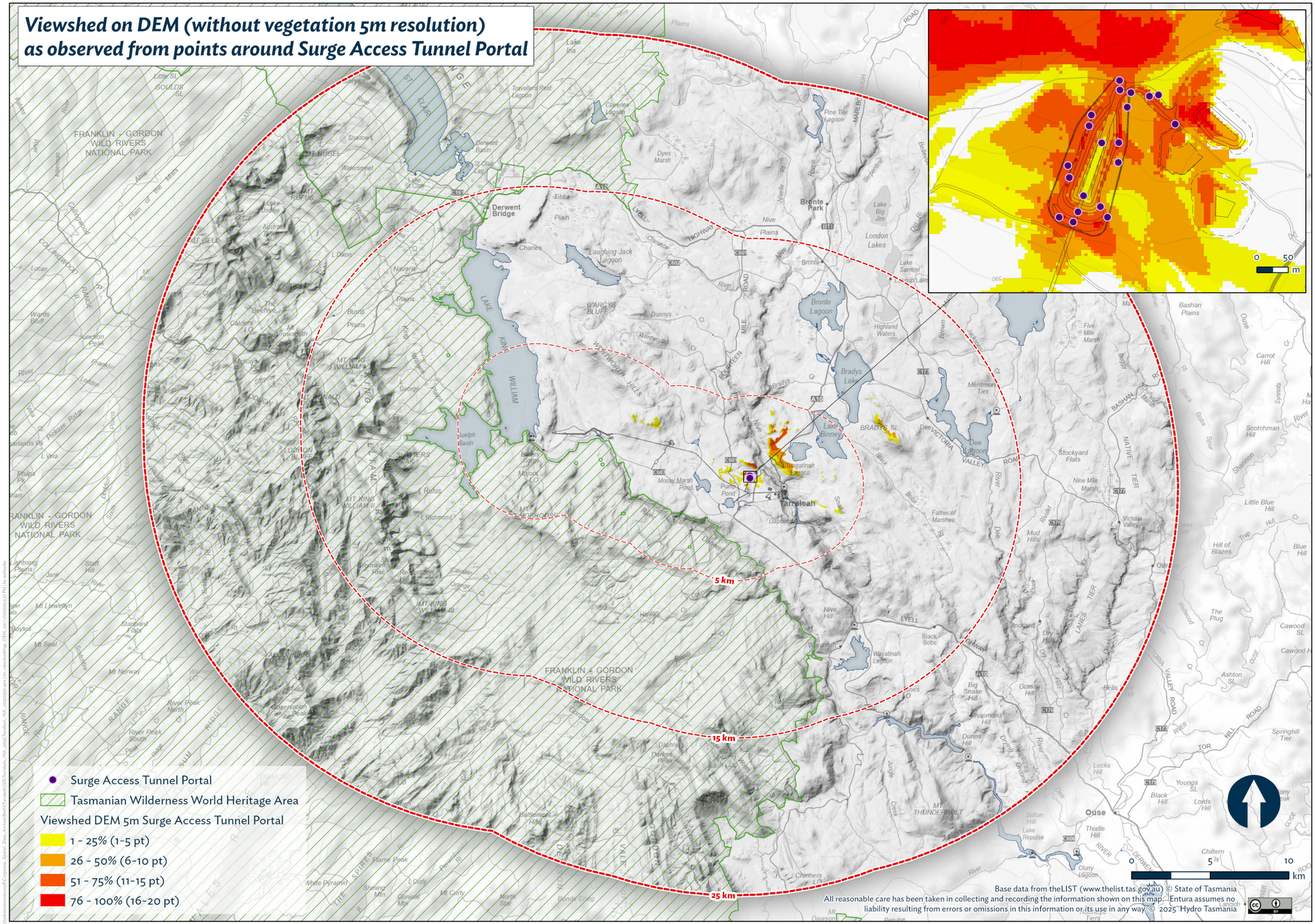
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Rising Main Pump station to Surge tower



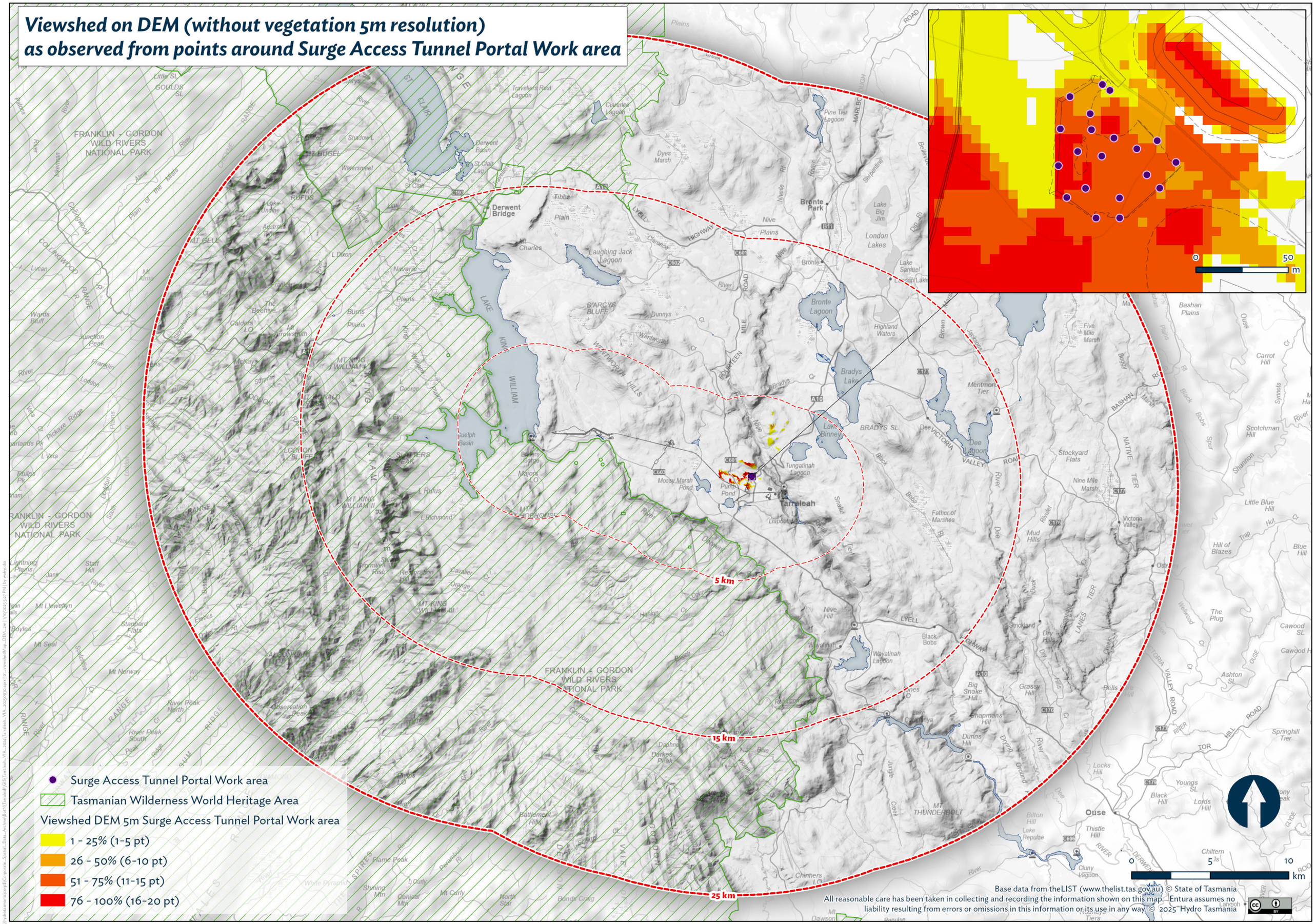
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Suction Main to Pump station



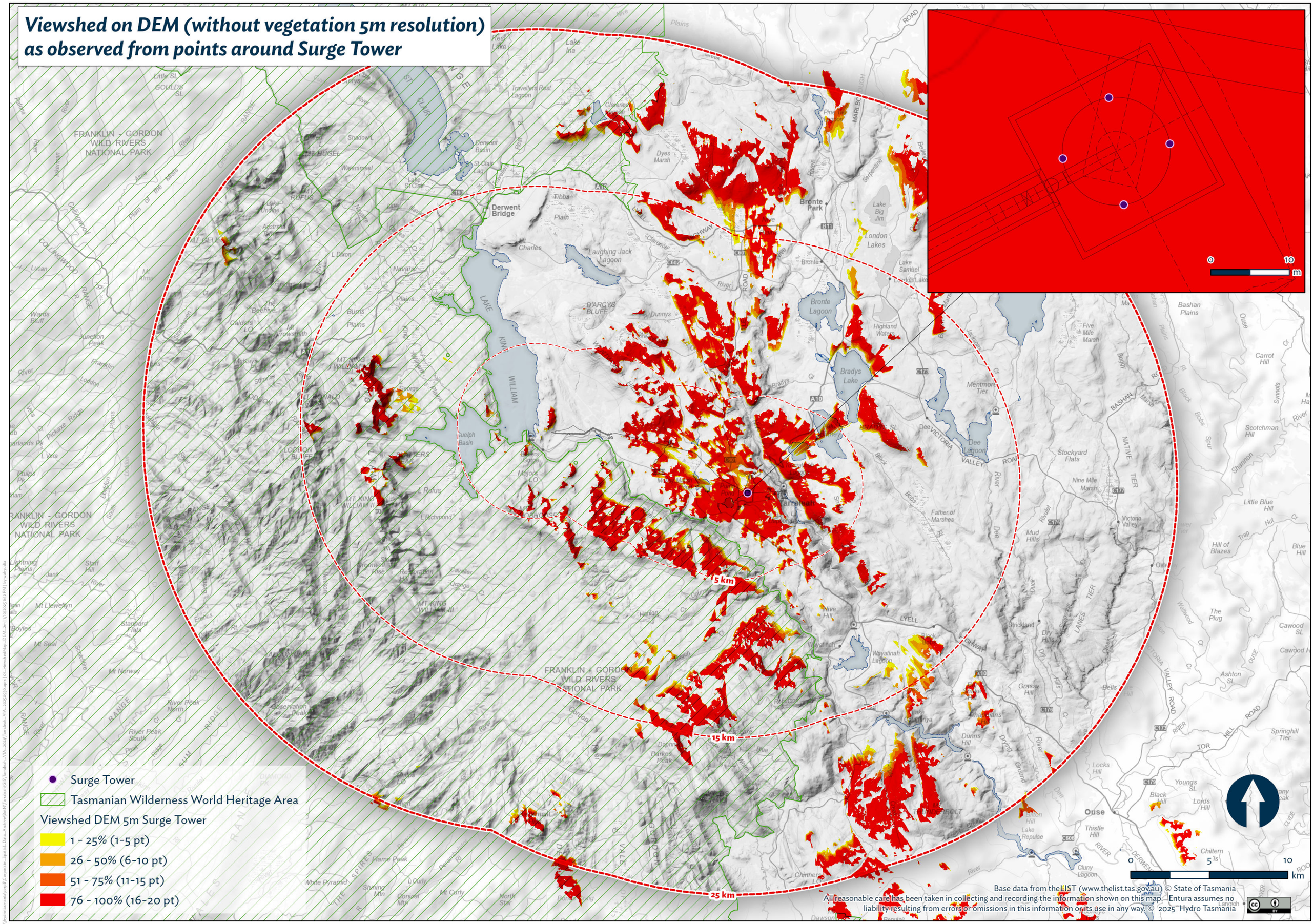
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Surge Access Tunnel Portal



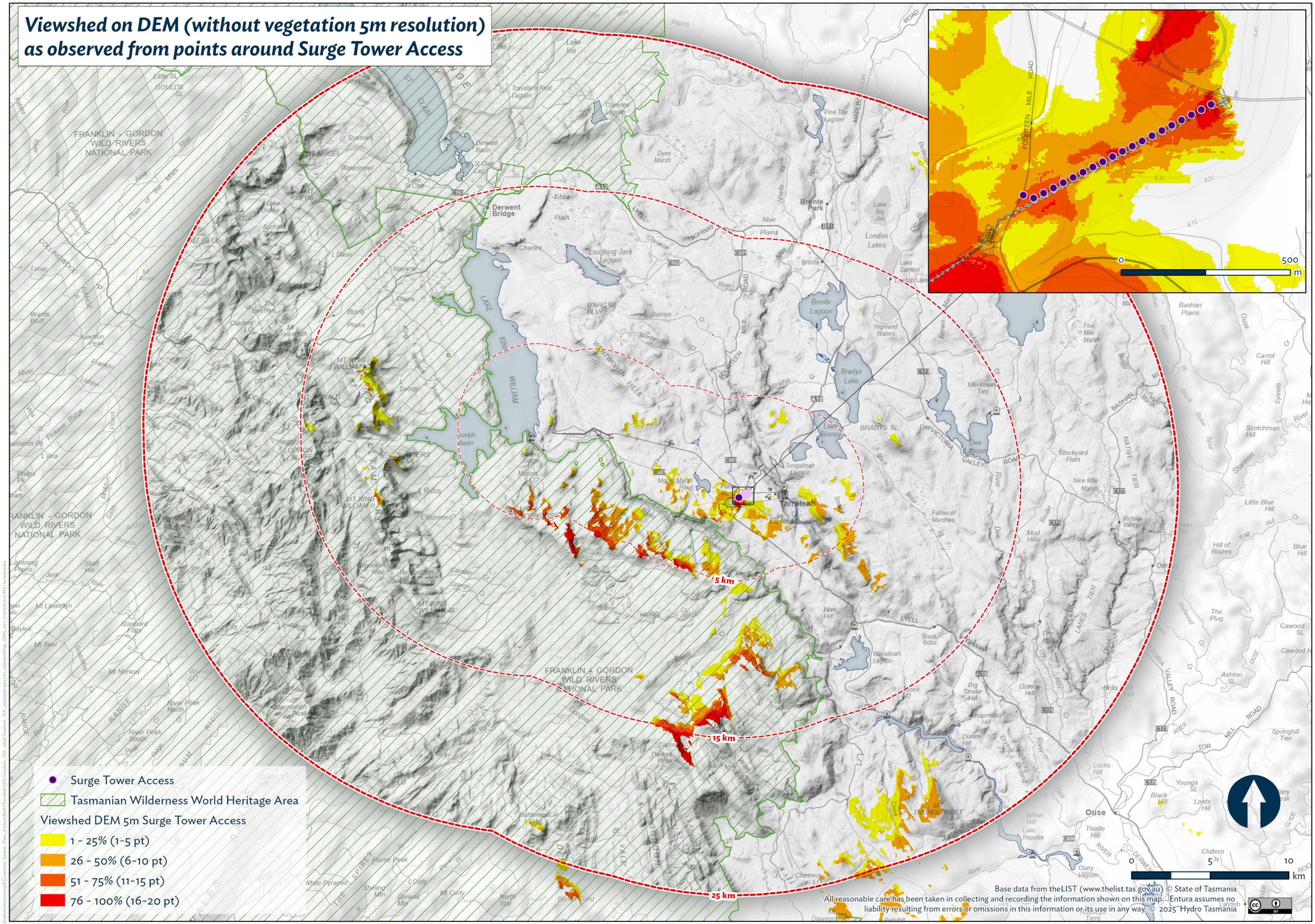
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Surge Access Tunnel Portal Work area



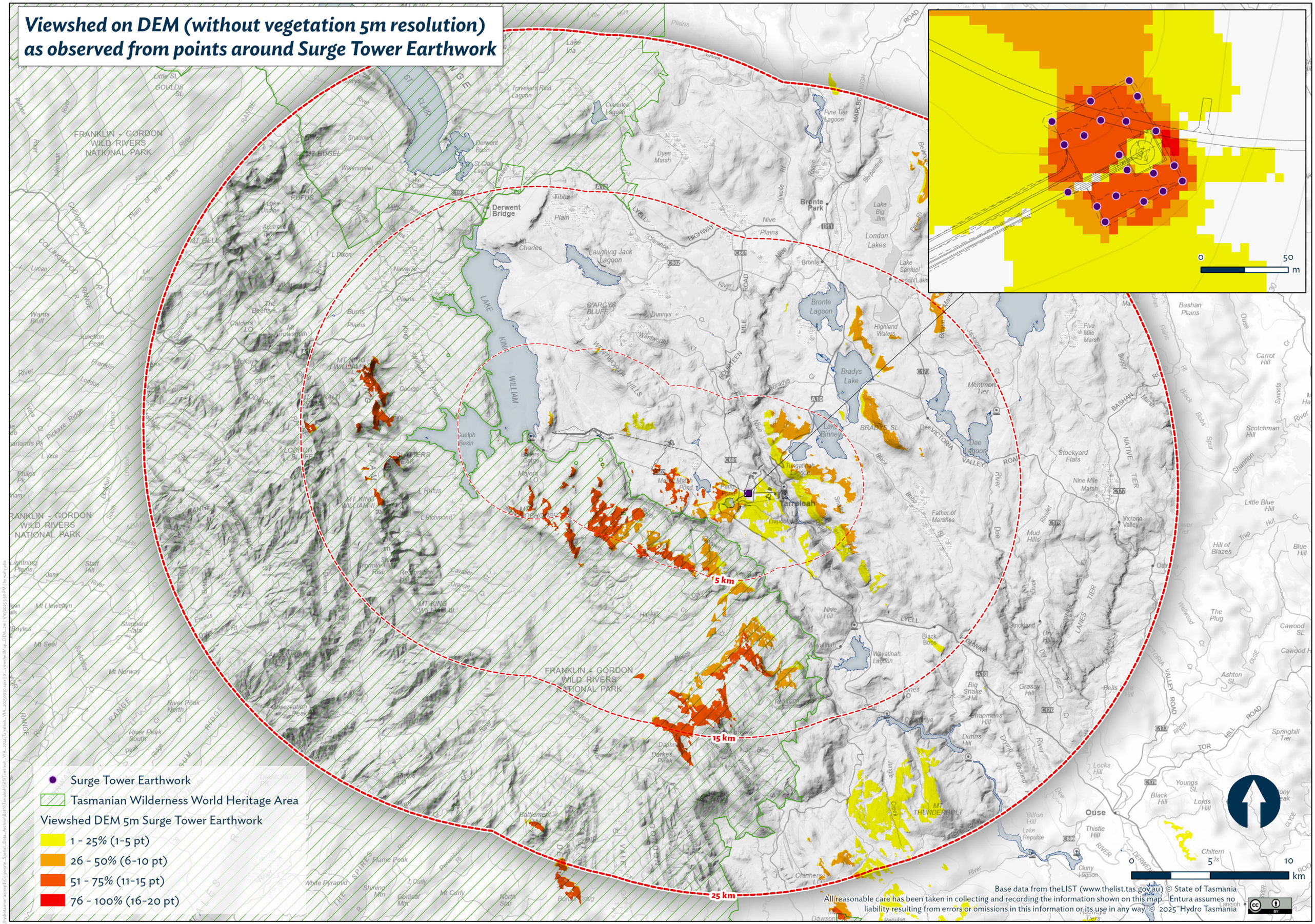
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Surge Tower



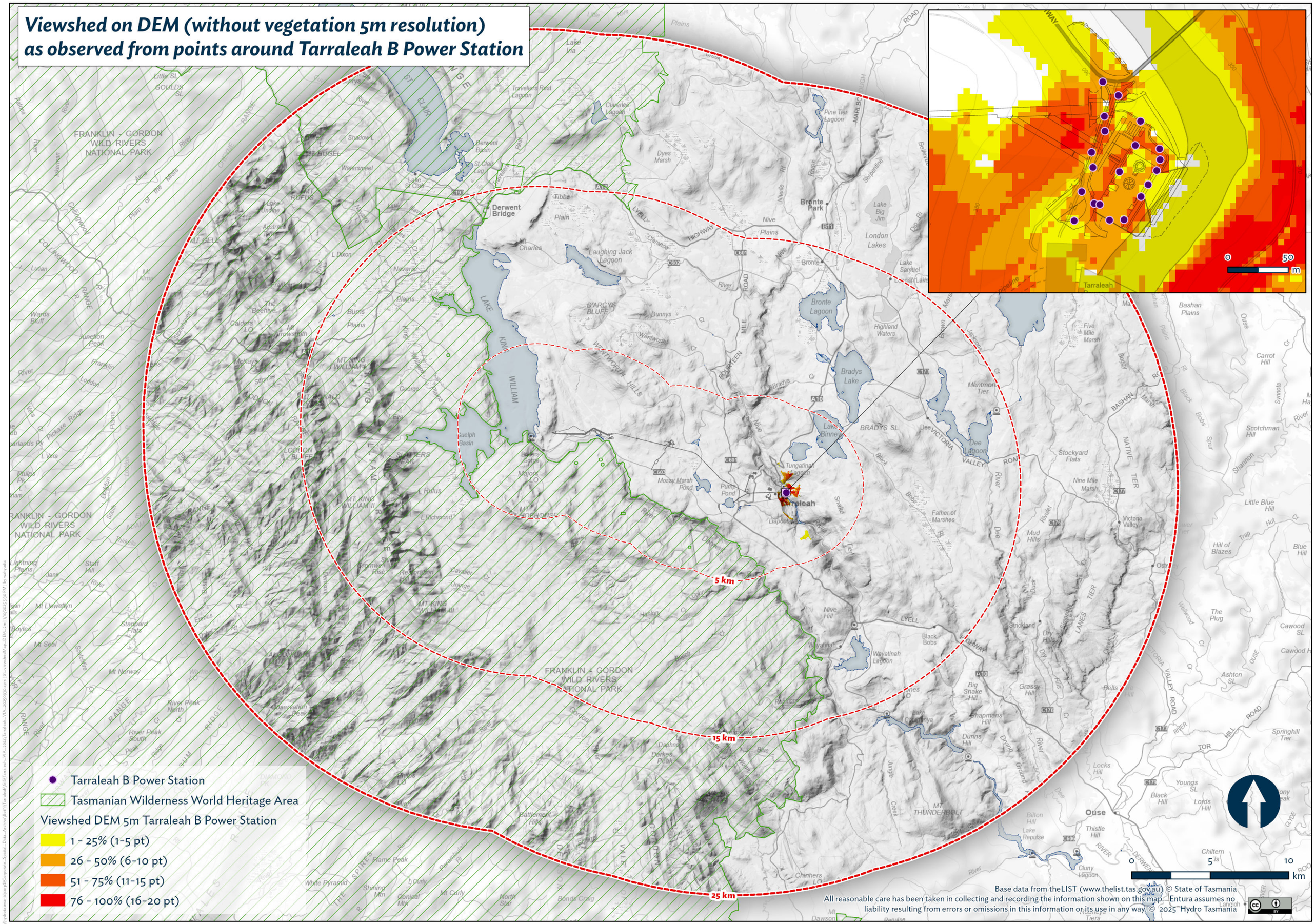
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Surge Tower Access



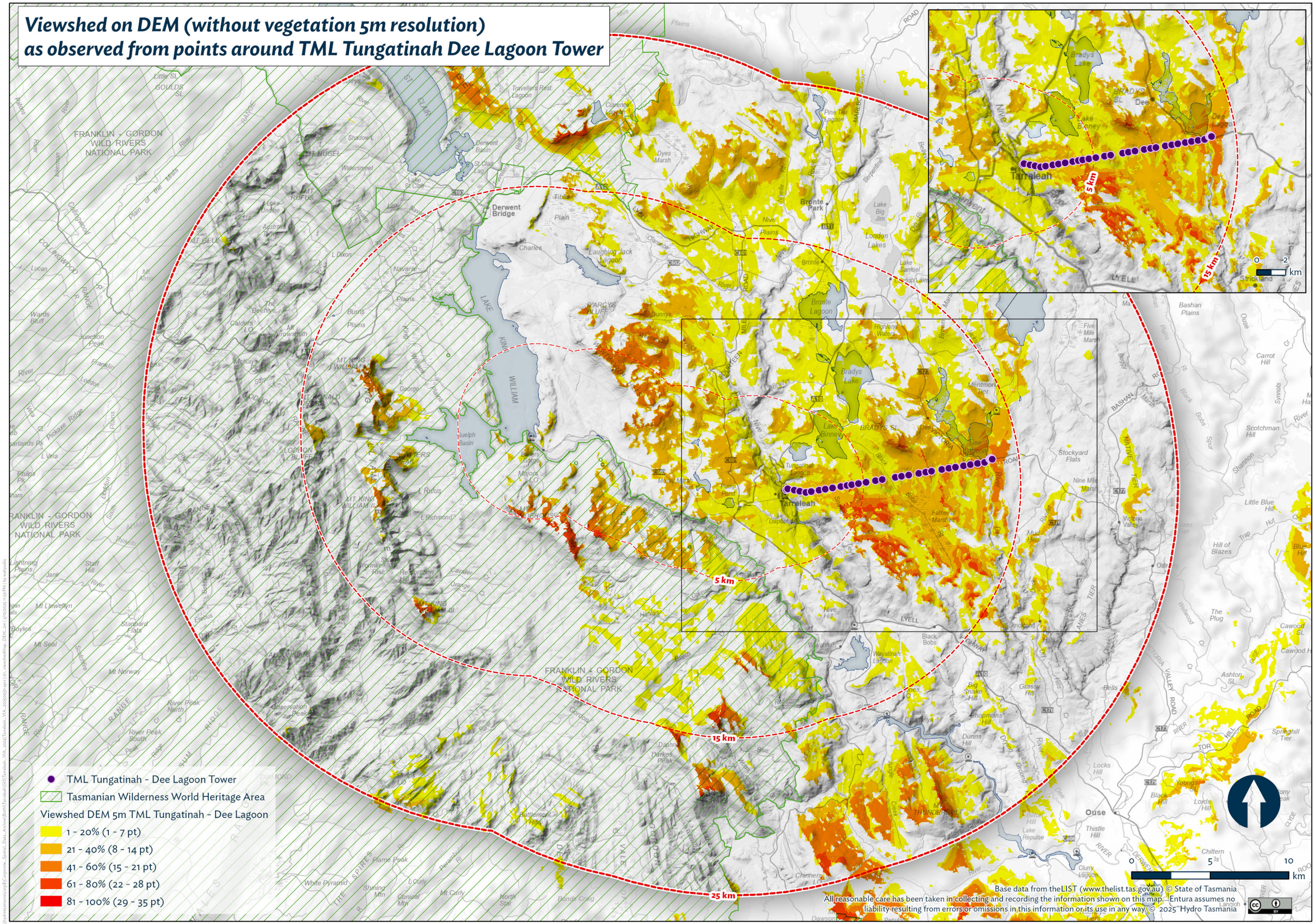
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Surge Tower Earthwork



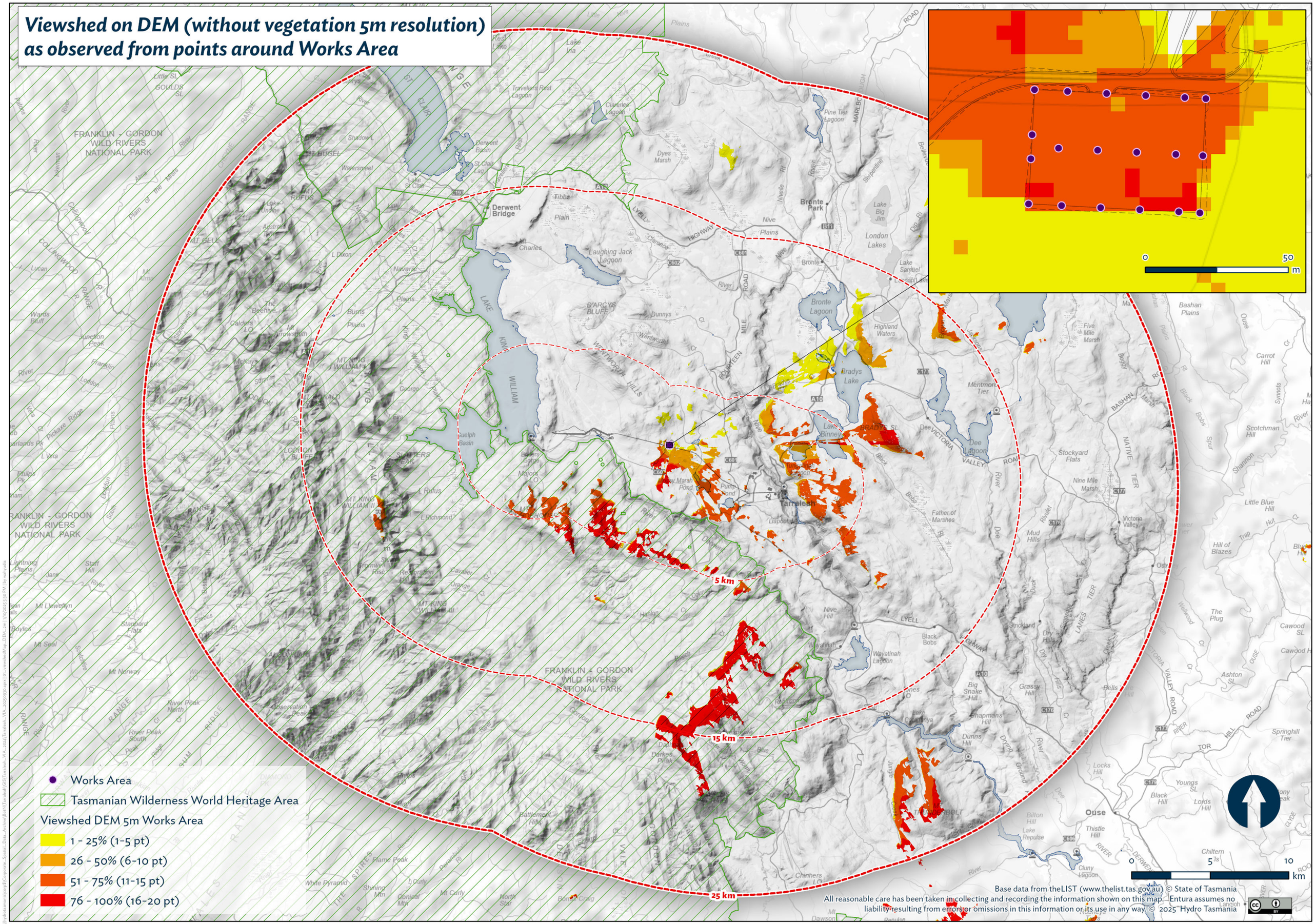
Viewshed on DEM (without vegetation 5m resolution) as observed from points around Tarraleah B Power Station



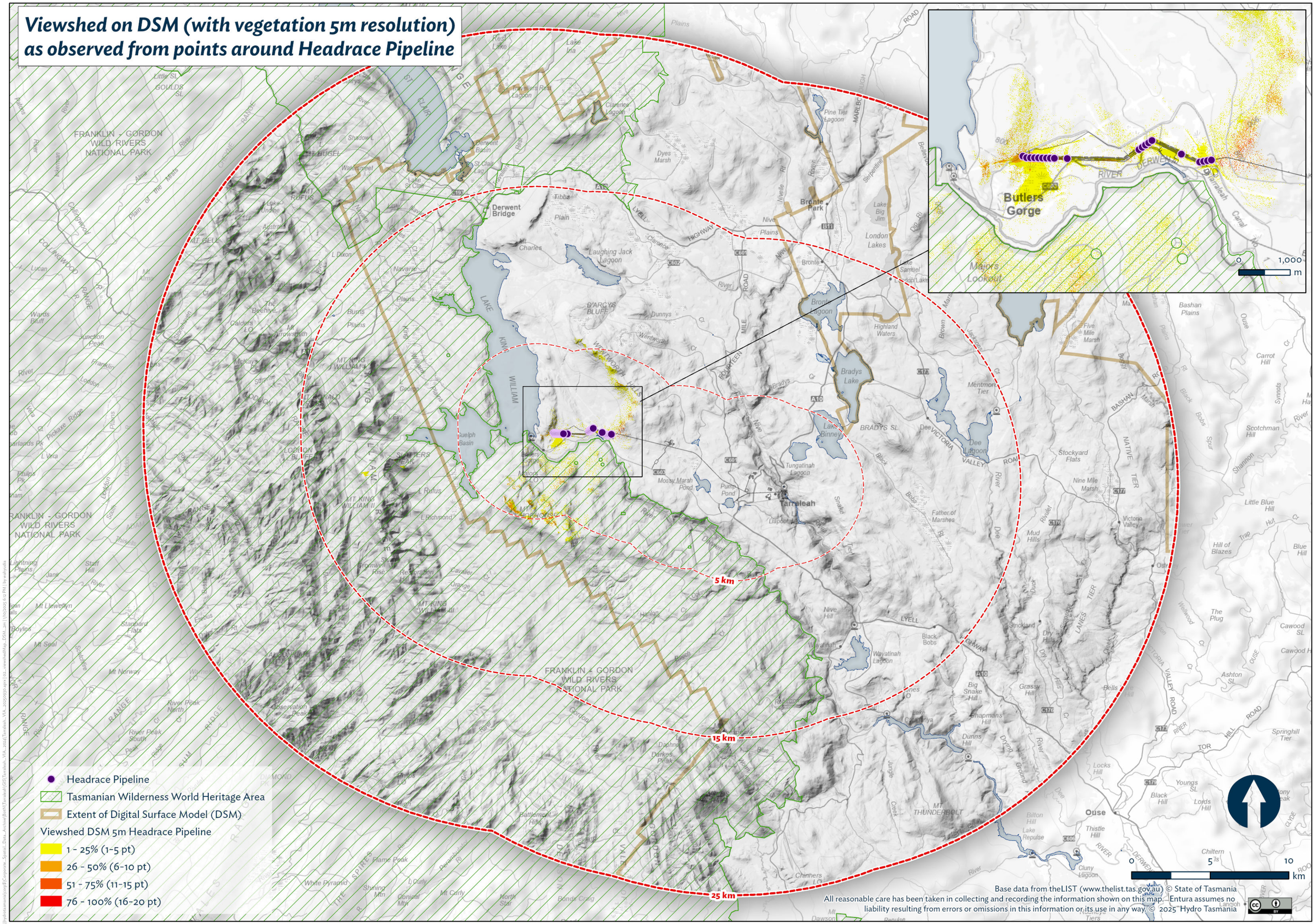
Viewshed on DEM (without vegetation 5m resolution) as observed from points around TML Tungatinah Dee Lagoon Tower



Viewshed on DEM (without vegetation 5m resolution) as observed from points around Works Area



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Pipeline



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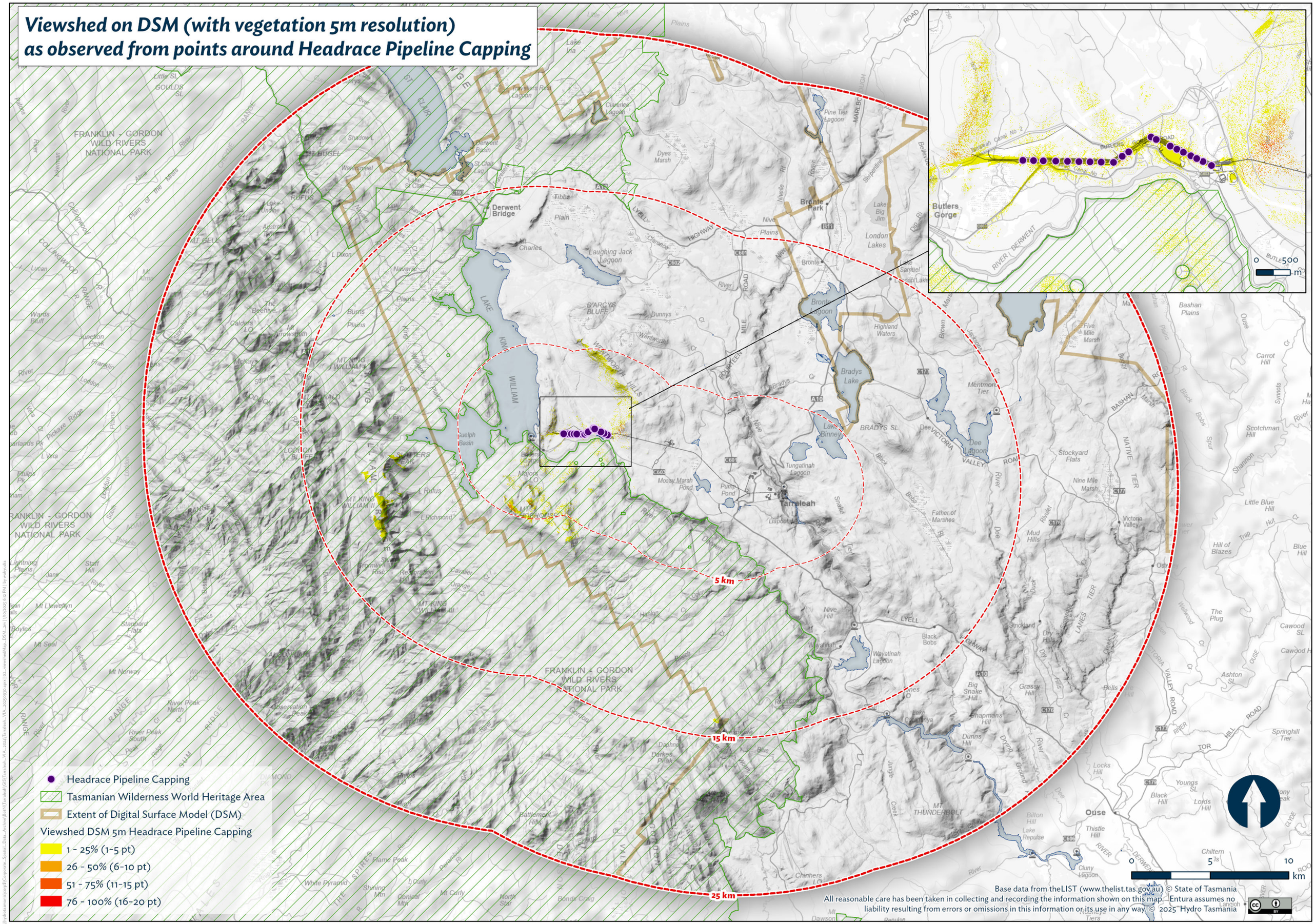
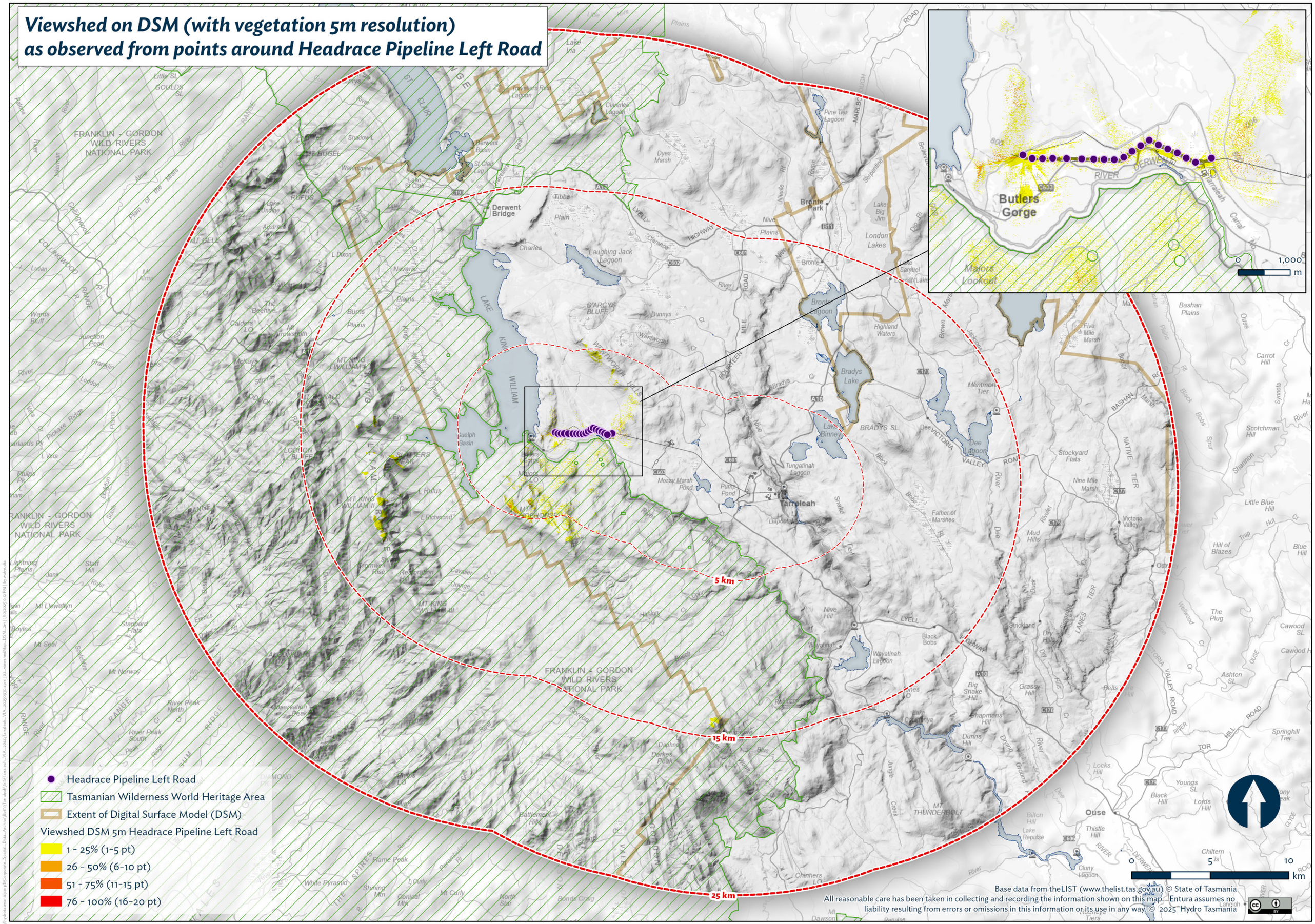
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Pipeline Capping



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Pipeline Left Road



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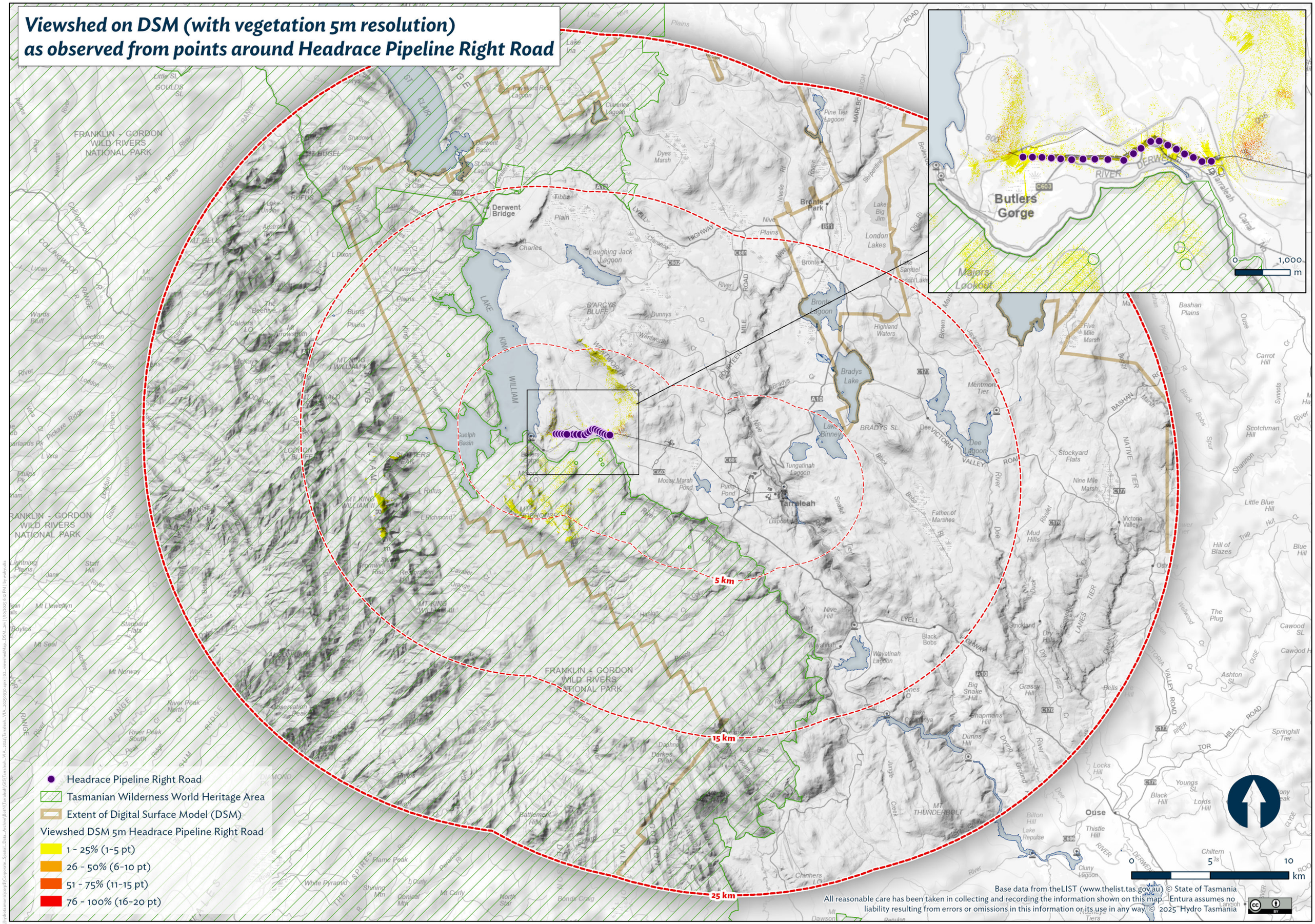
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Pipeline Right Road



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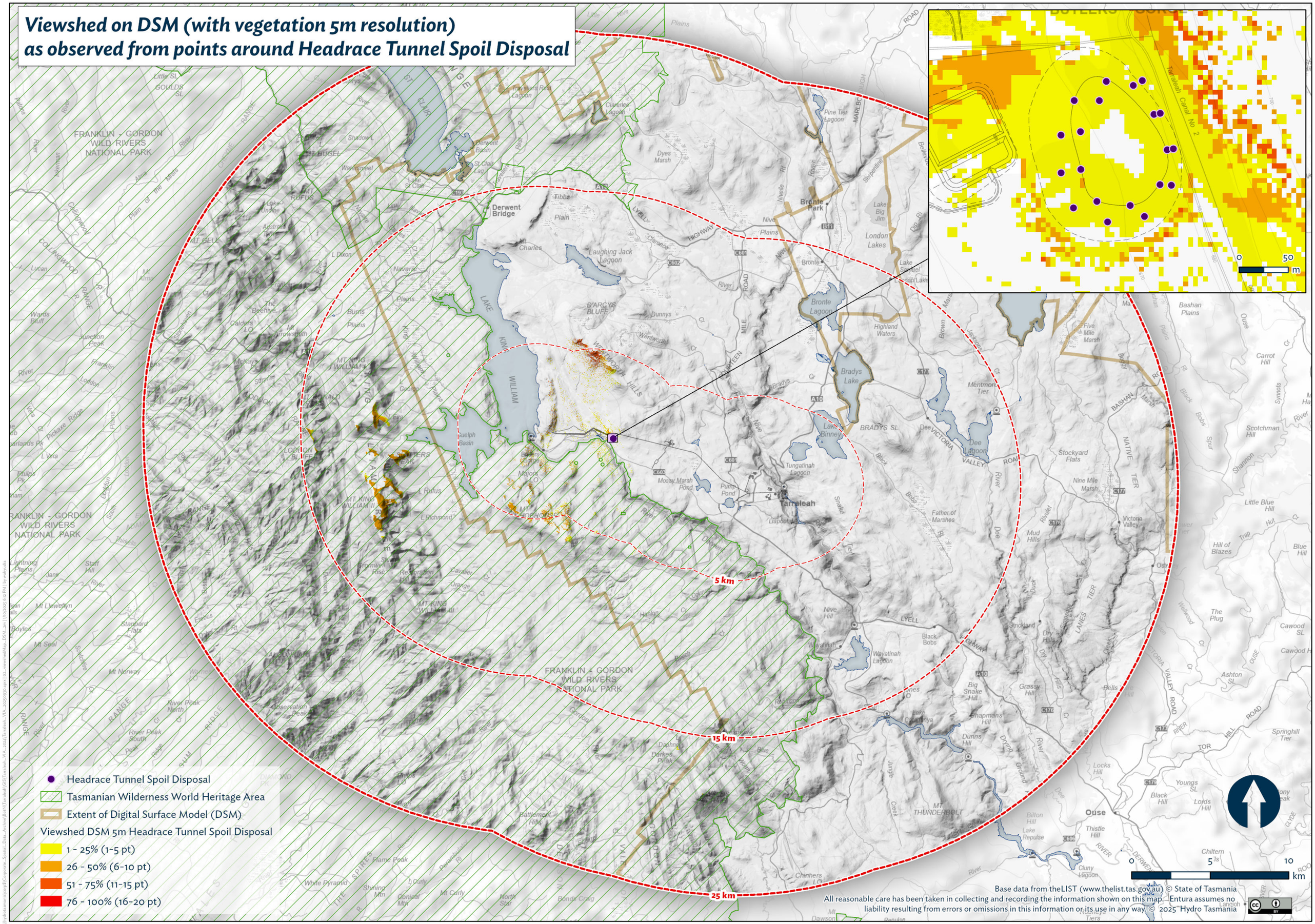
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Tunnel Spoil Disposal



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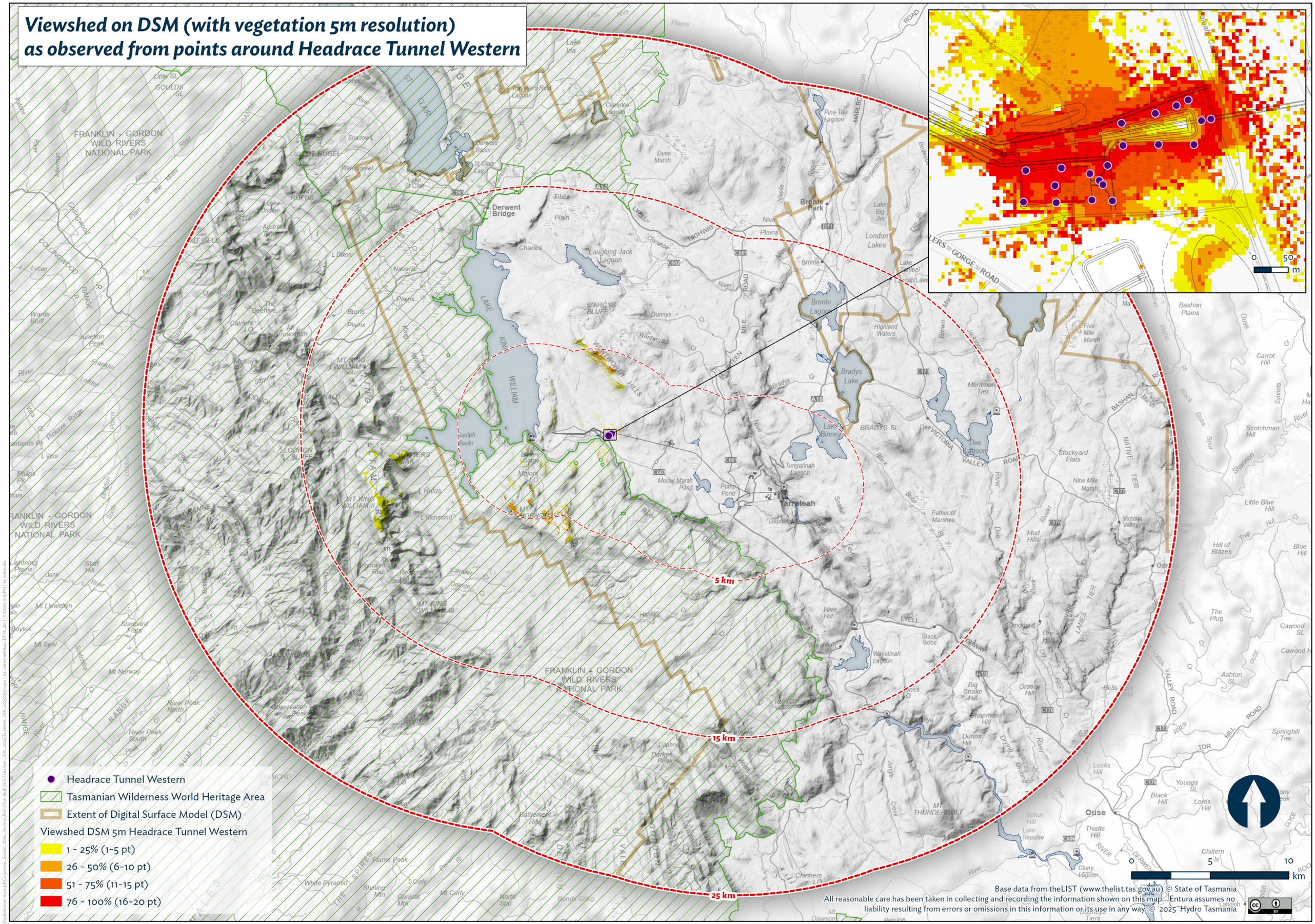
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Headrace Tunnel Western



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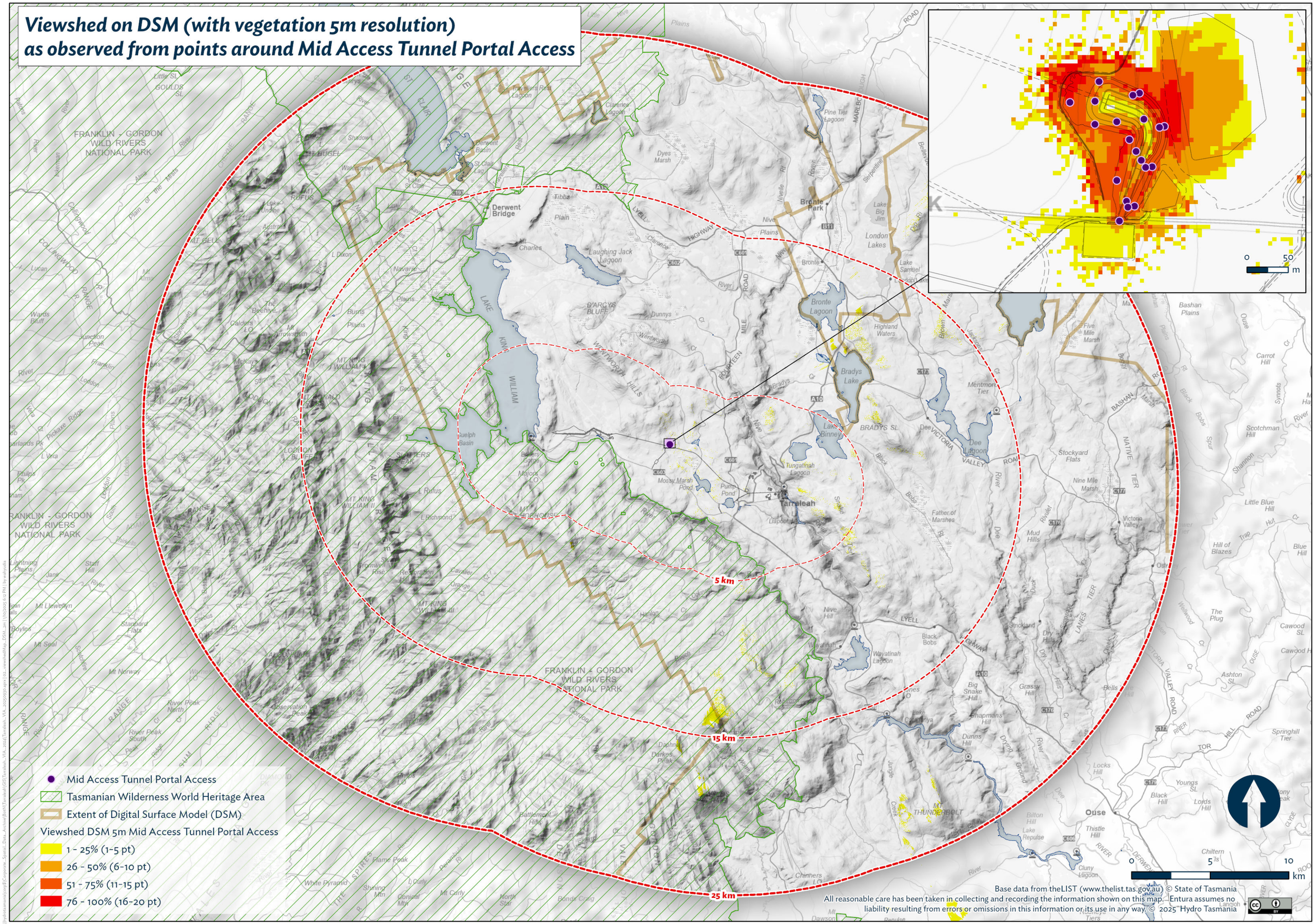
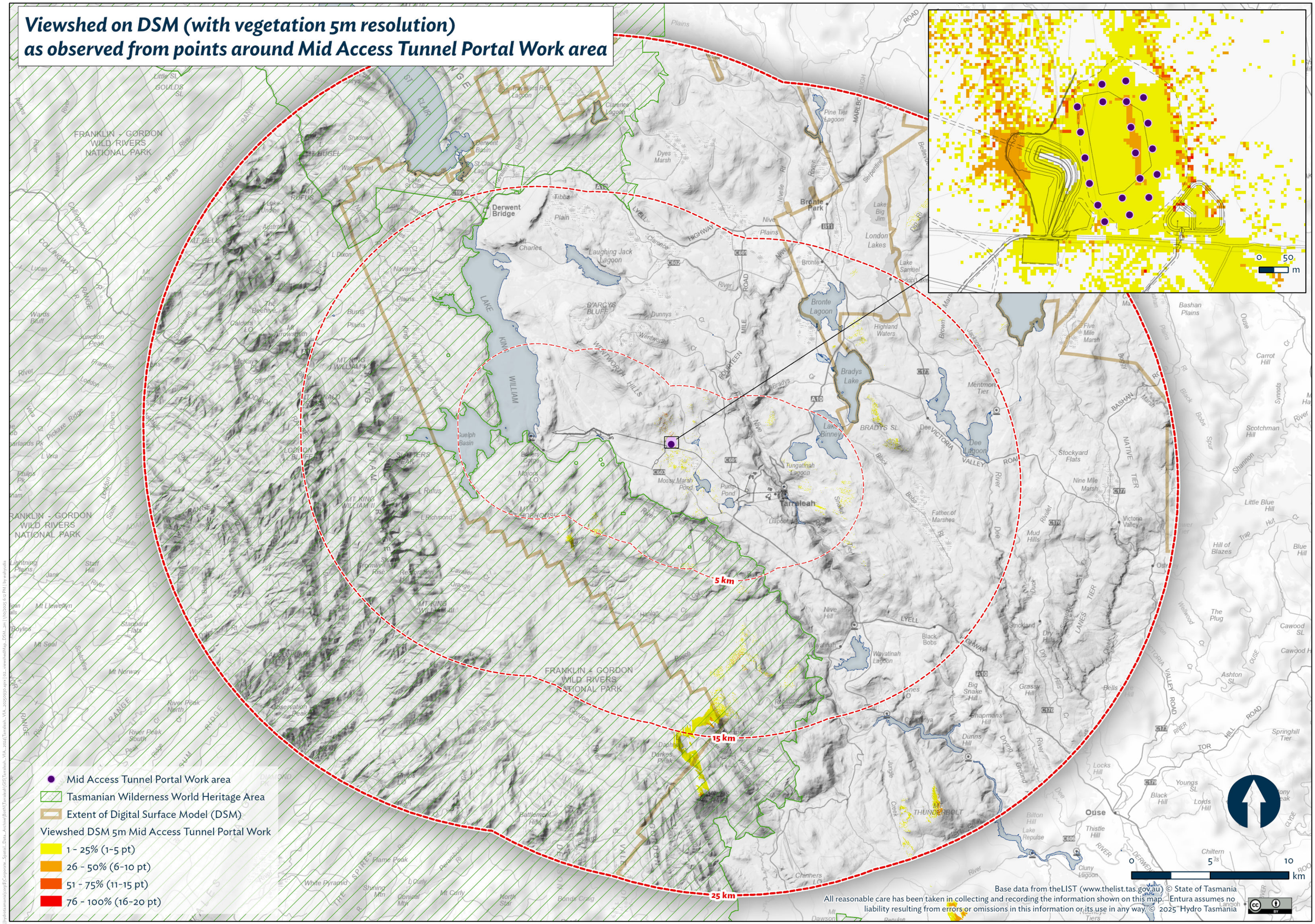
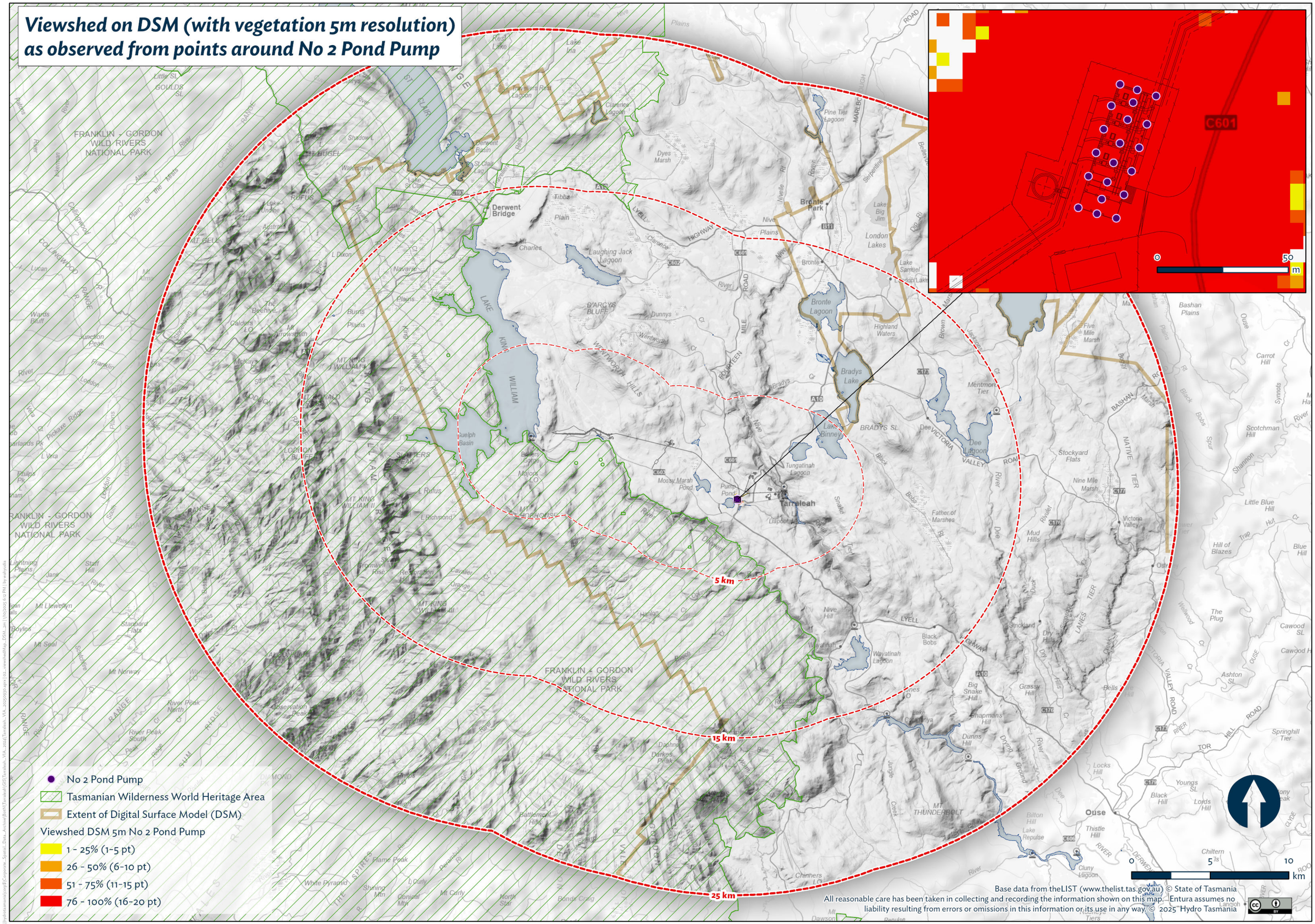
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Mid Access Tunnel Portal Access



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Mid Access Tunnel Portal Work area



Viewshed on DSM (with vegetation 5m resolution) as observed from points around No 2 Pond Pump



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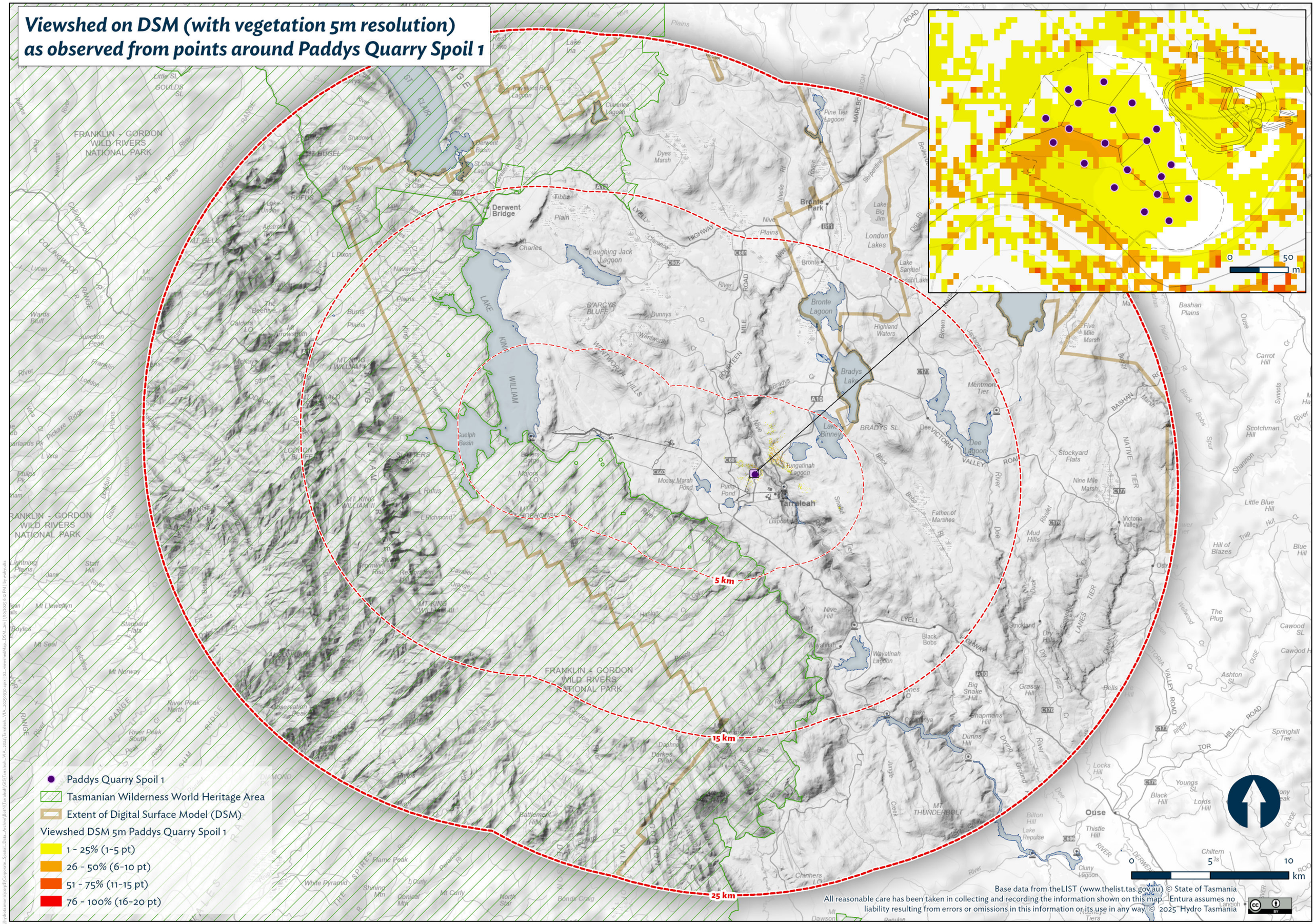
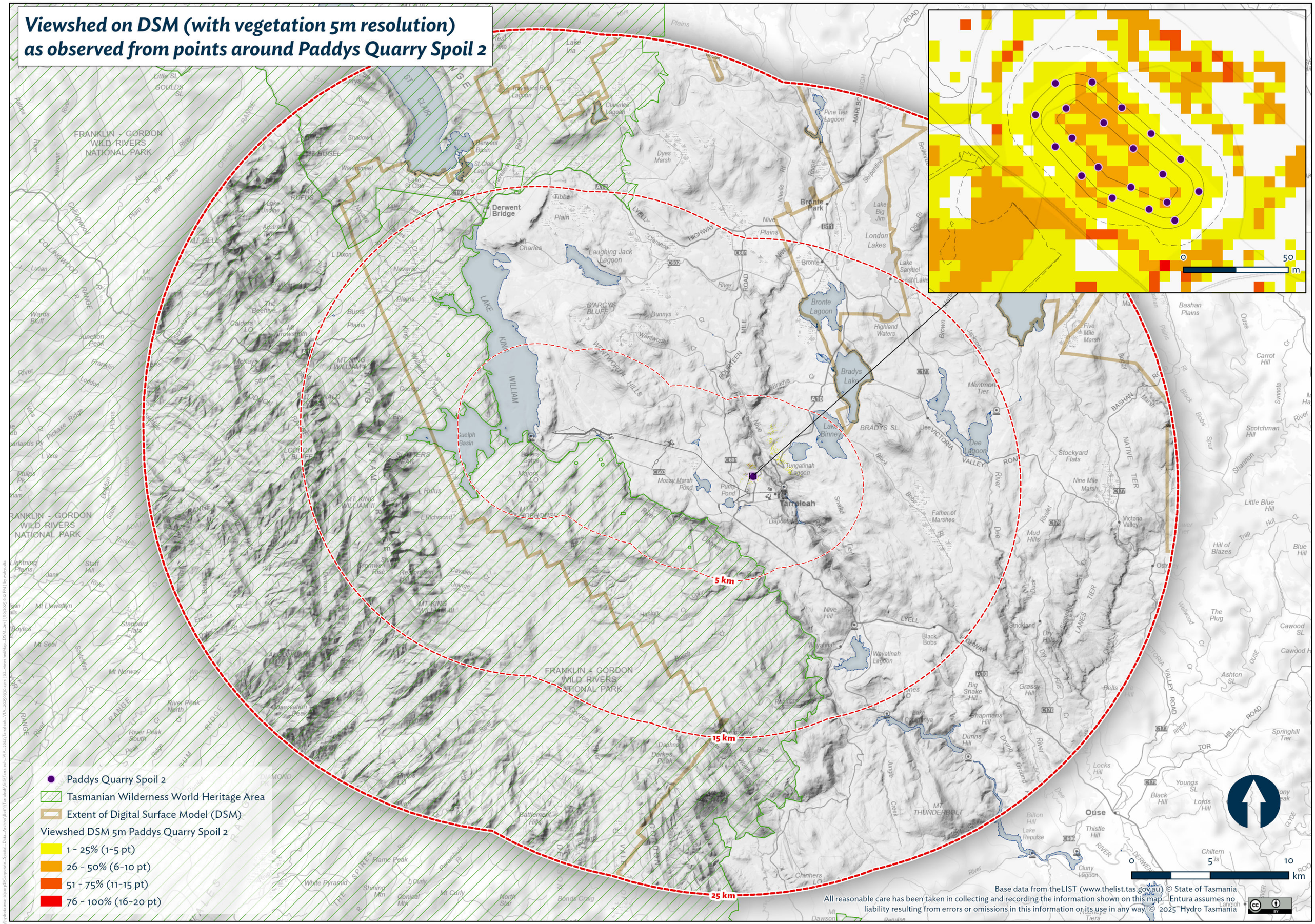
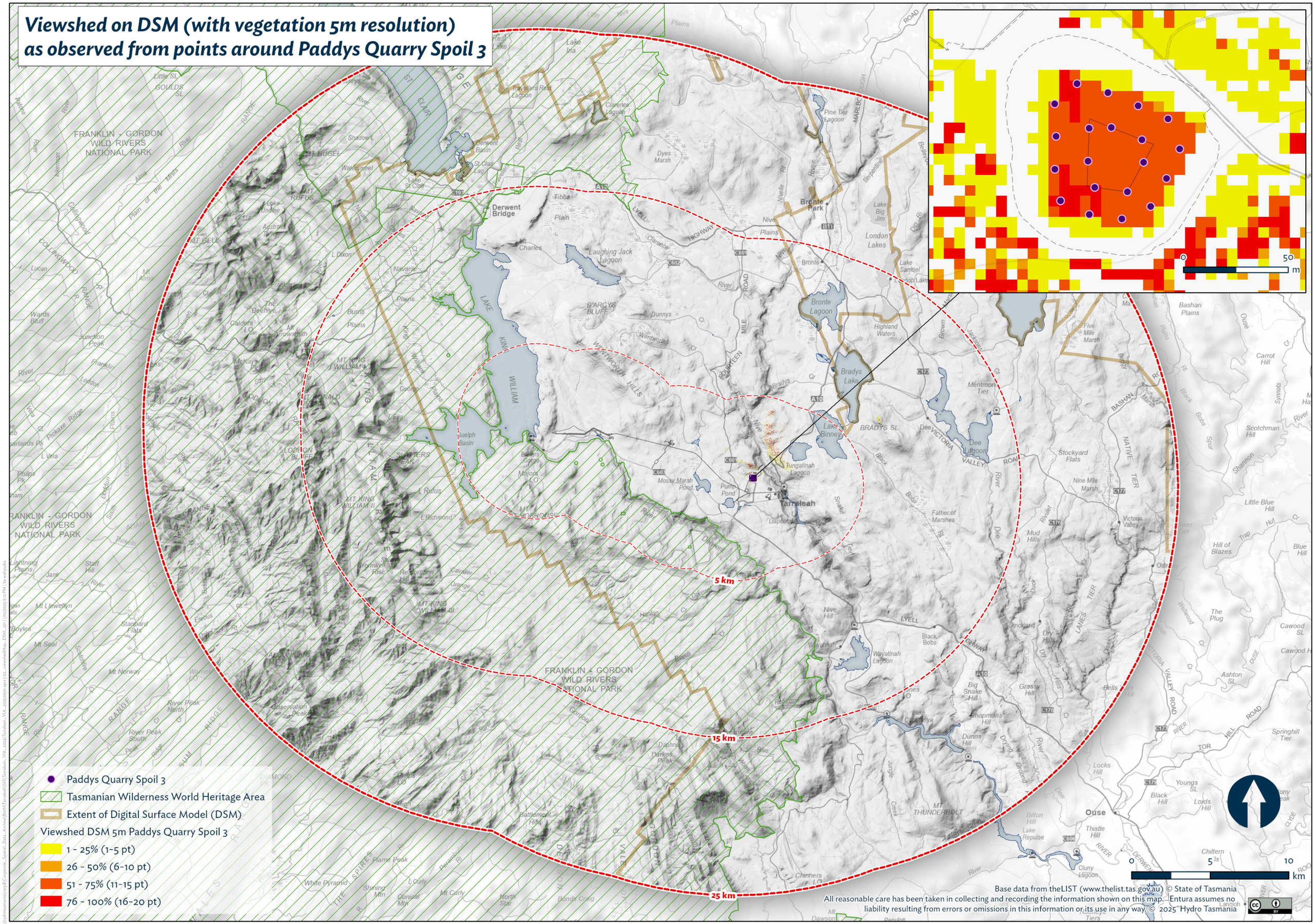
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Paddys Quarry Spoil 1



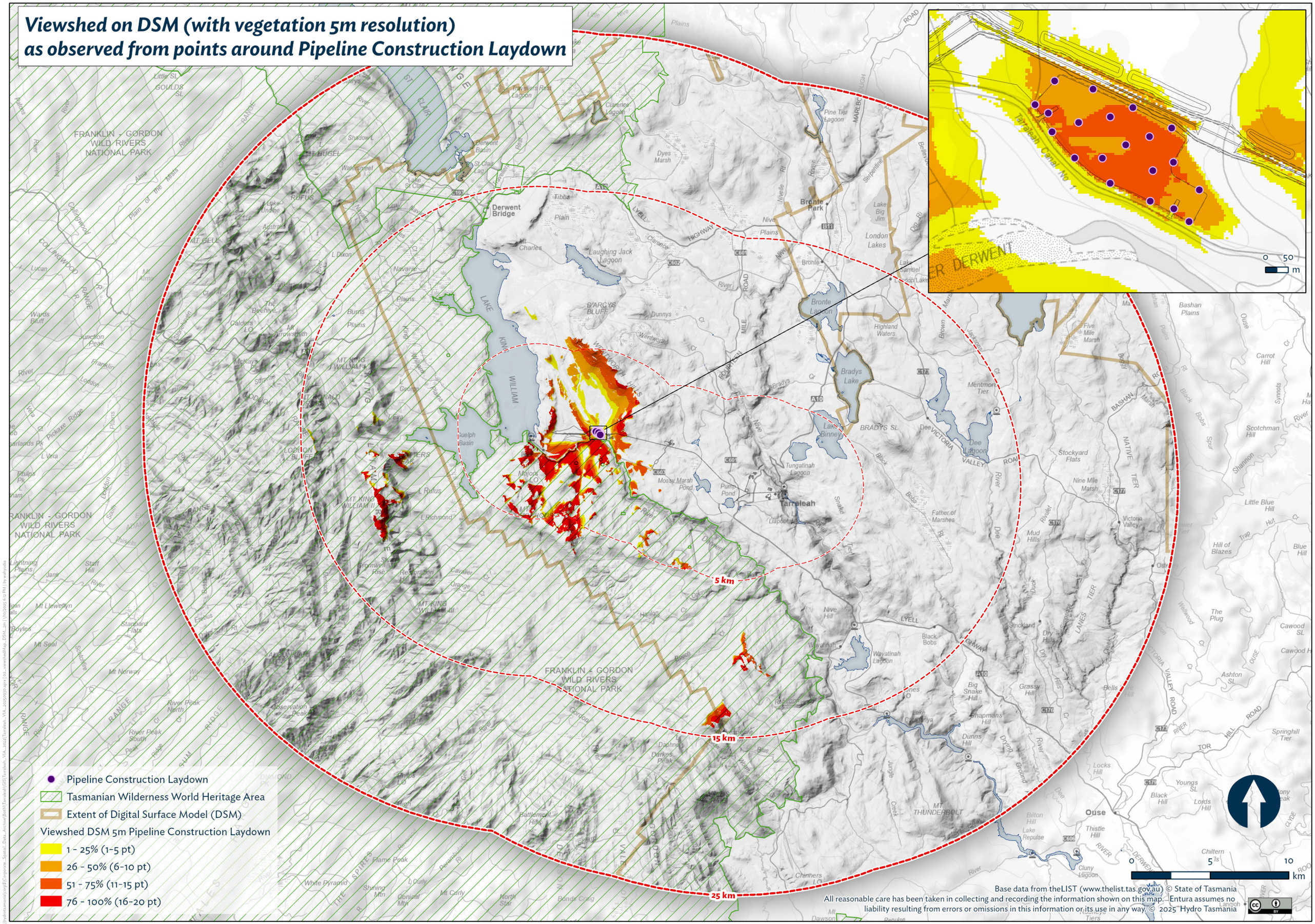
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Paddys Quarry Spoil 2



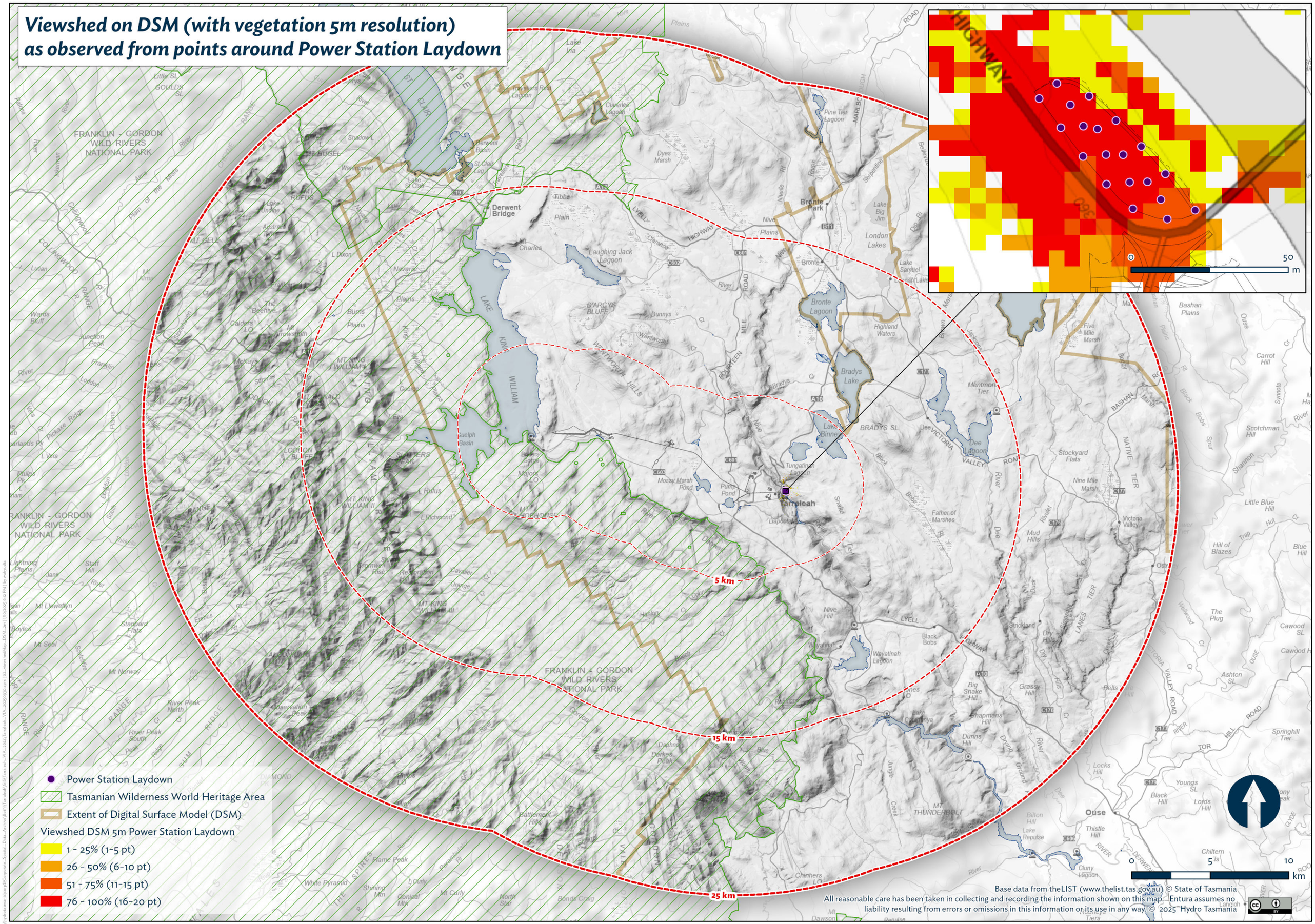
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Paddys Quarry Spoil 3



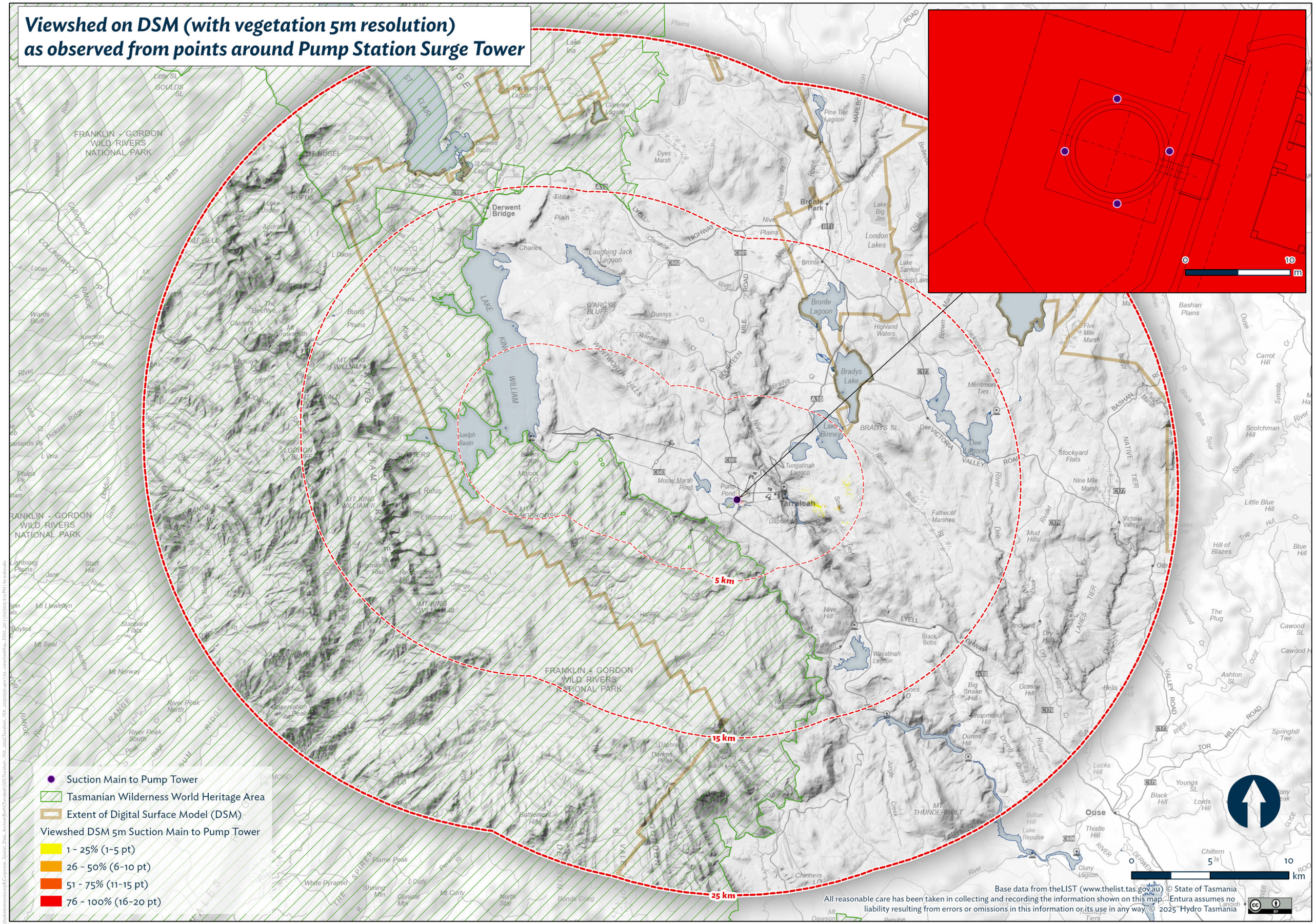
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Pipeline Construction Laydown



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Power Station Laydown



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Pump Station Surge Tower



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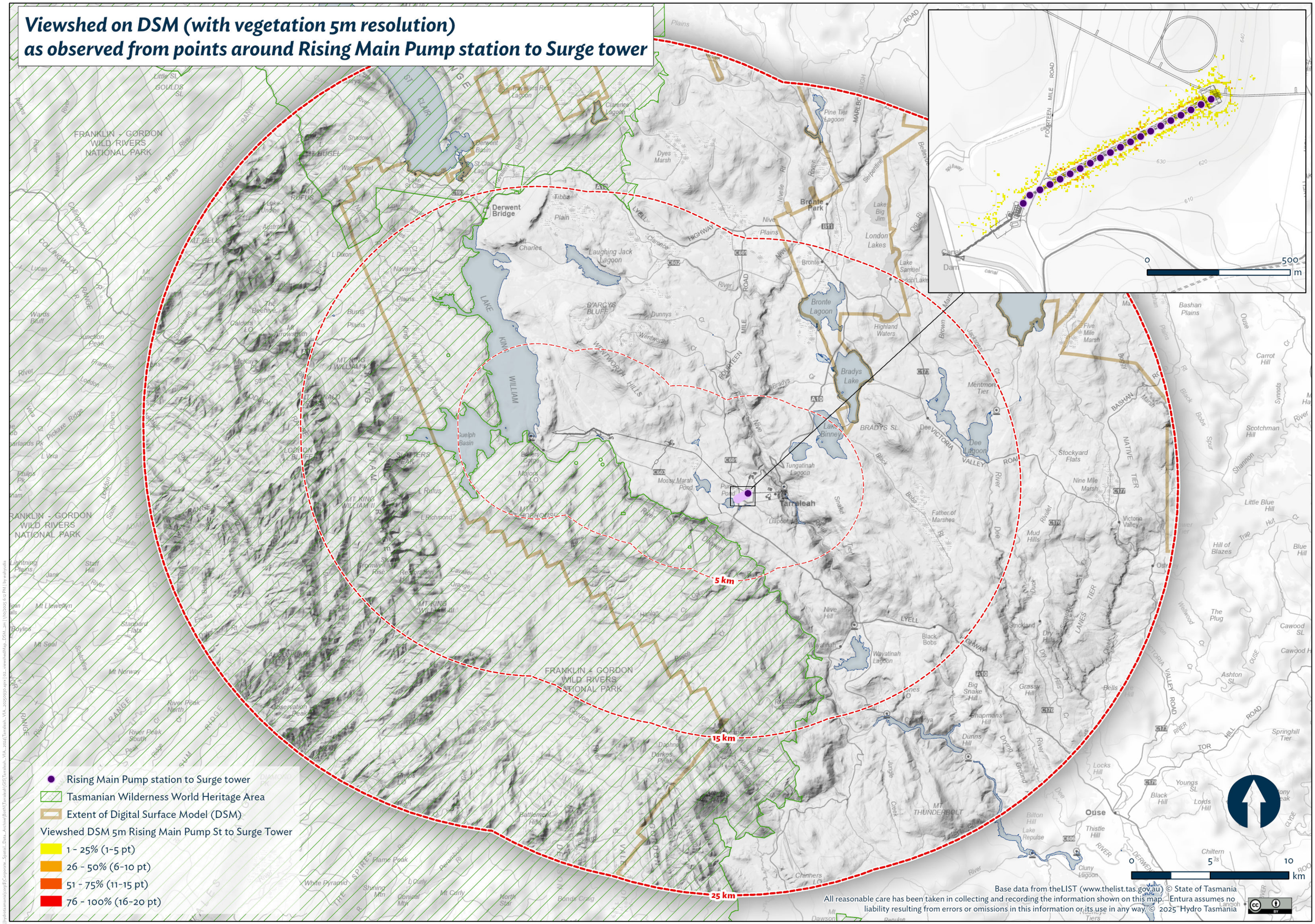
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Rising Main Pump station to Surge tower



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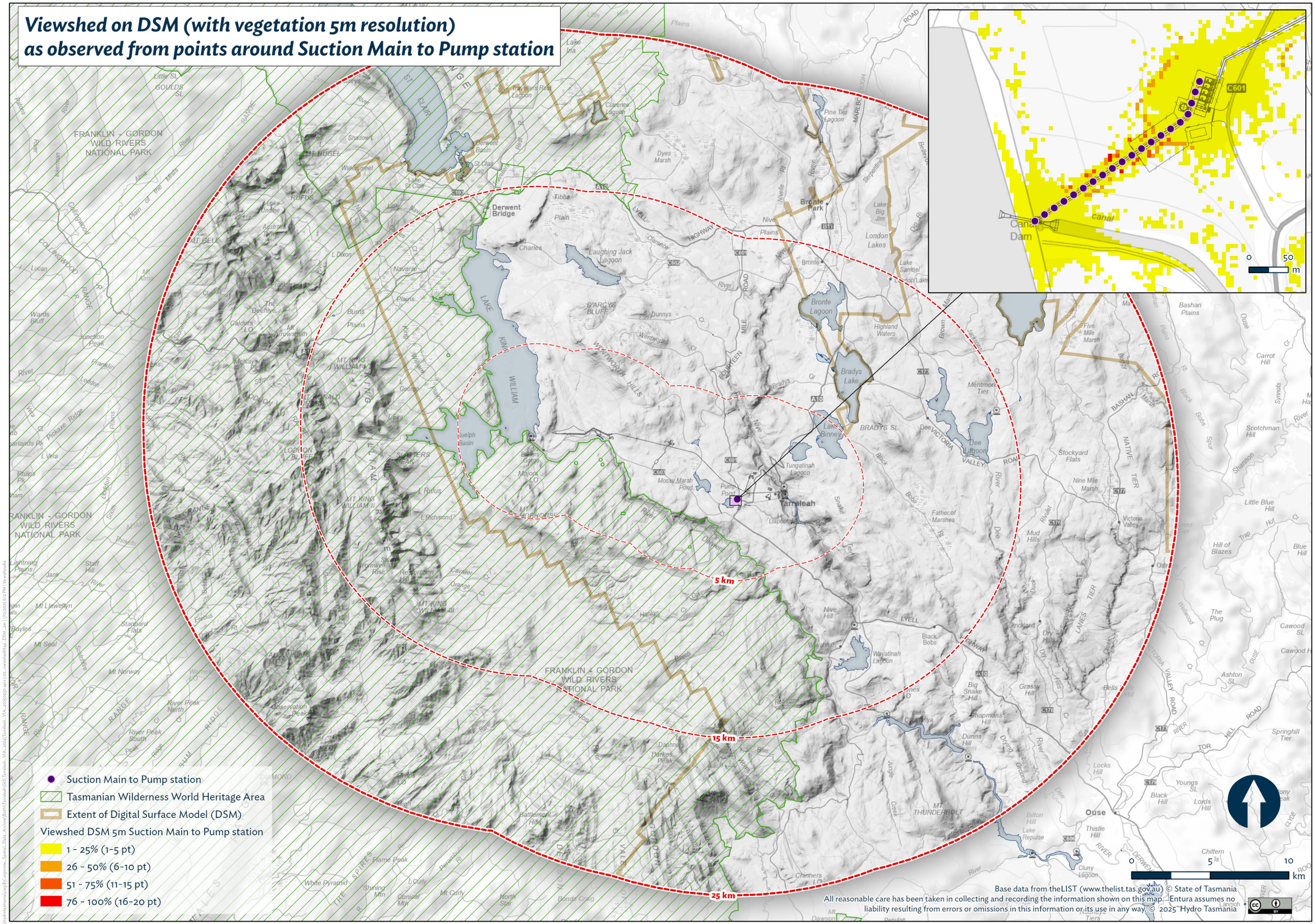
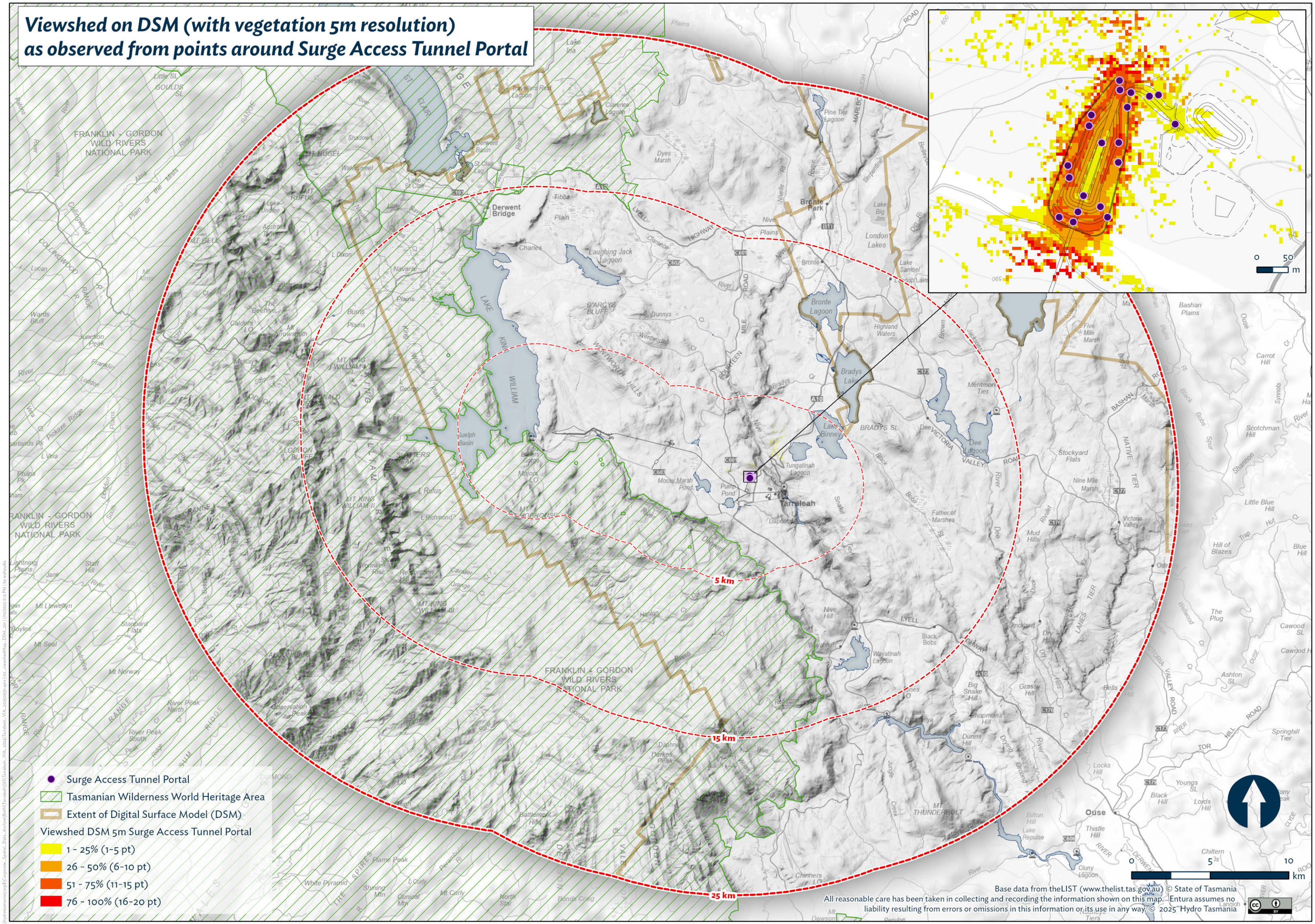
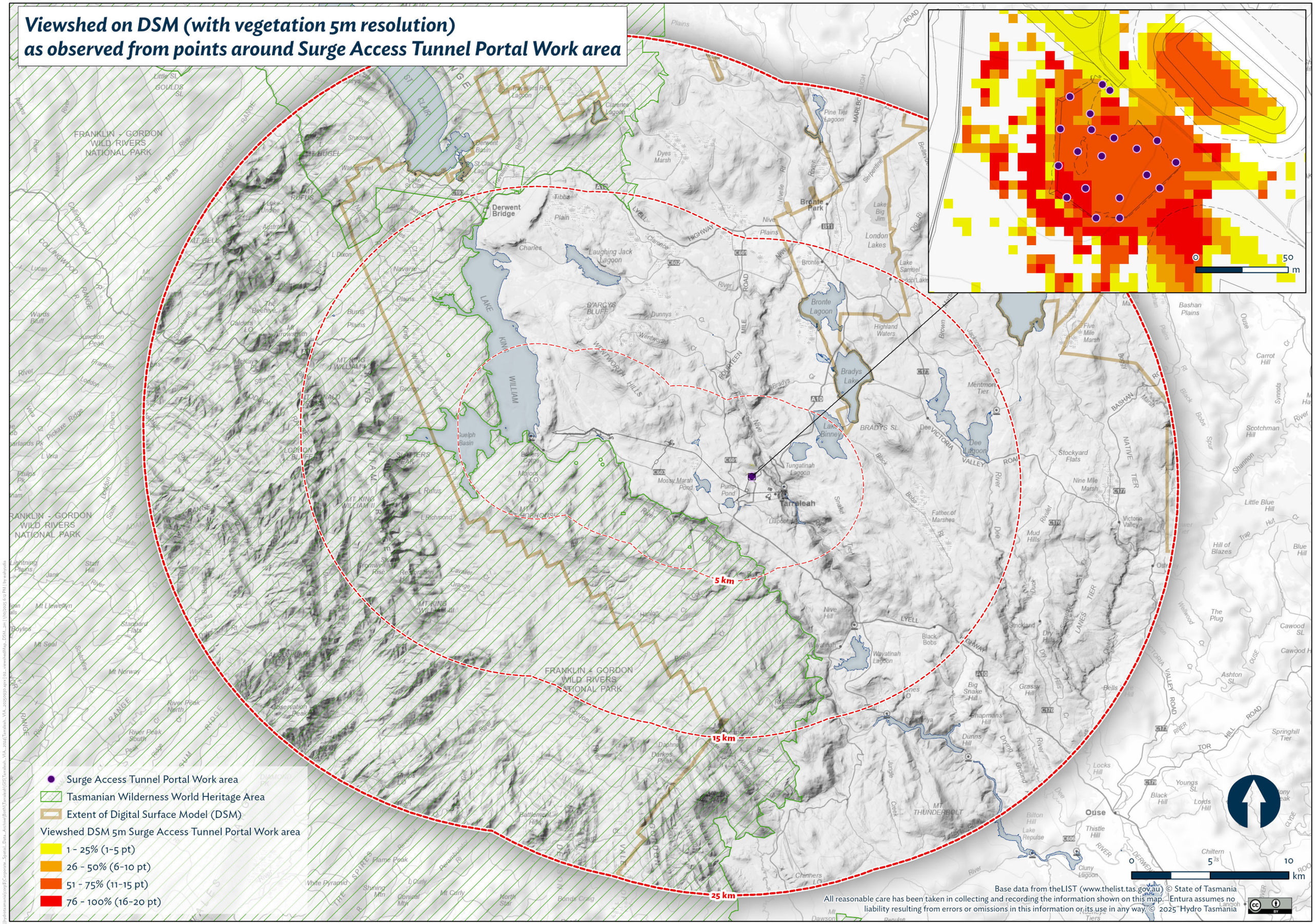
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Suction Main to Pump station



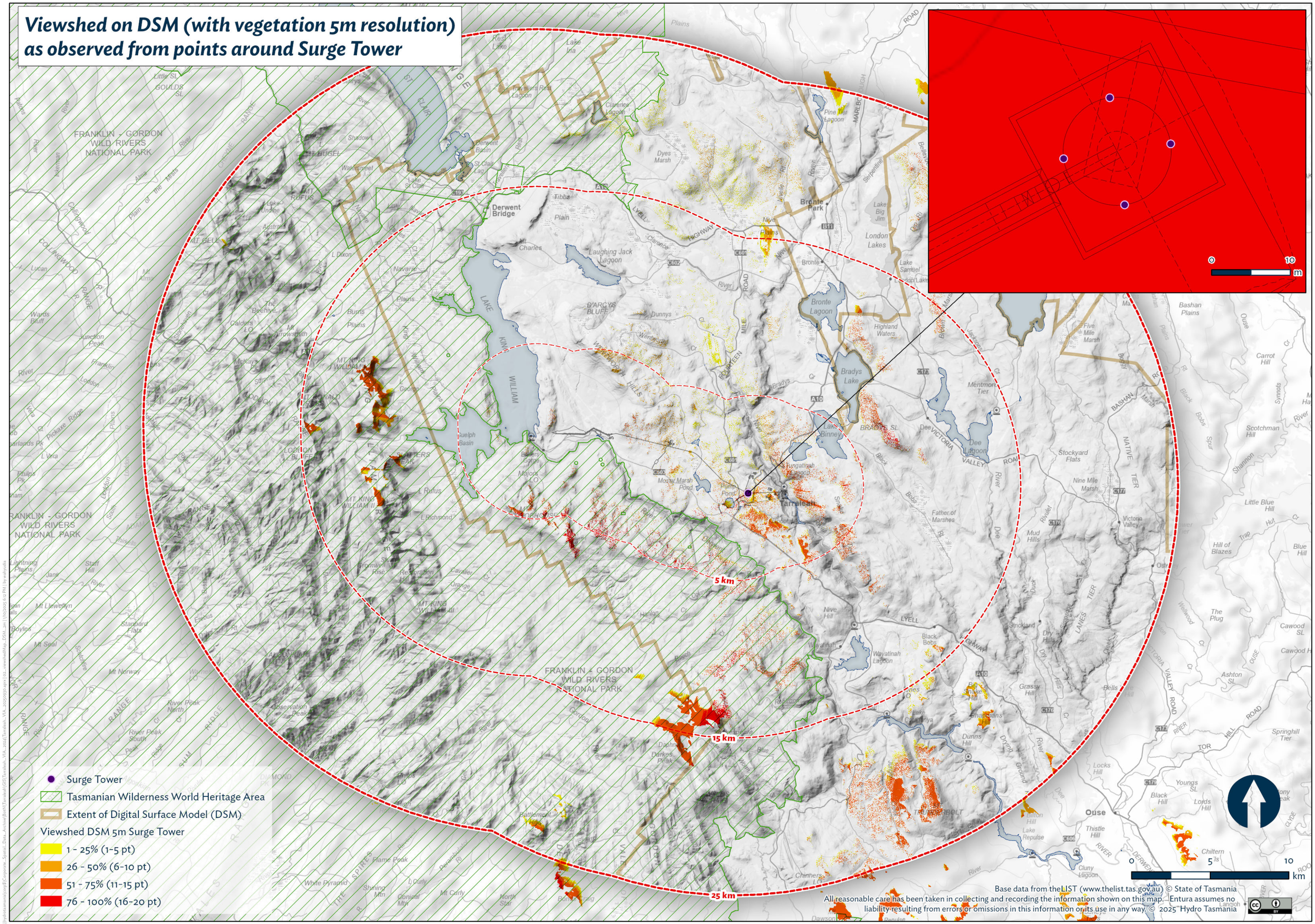
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Surge Access Tunnel Portal



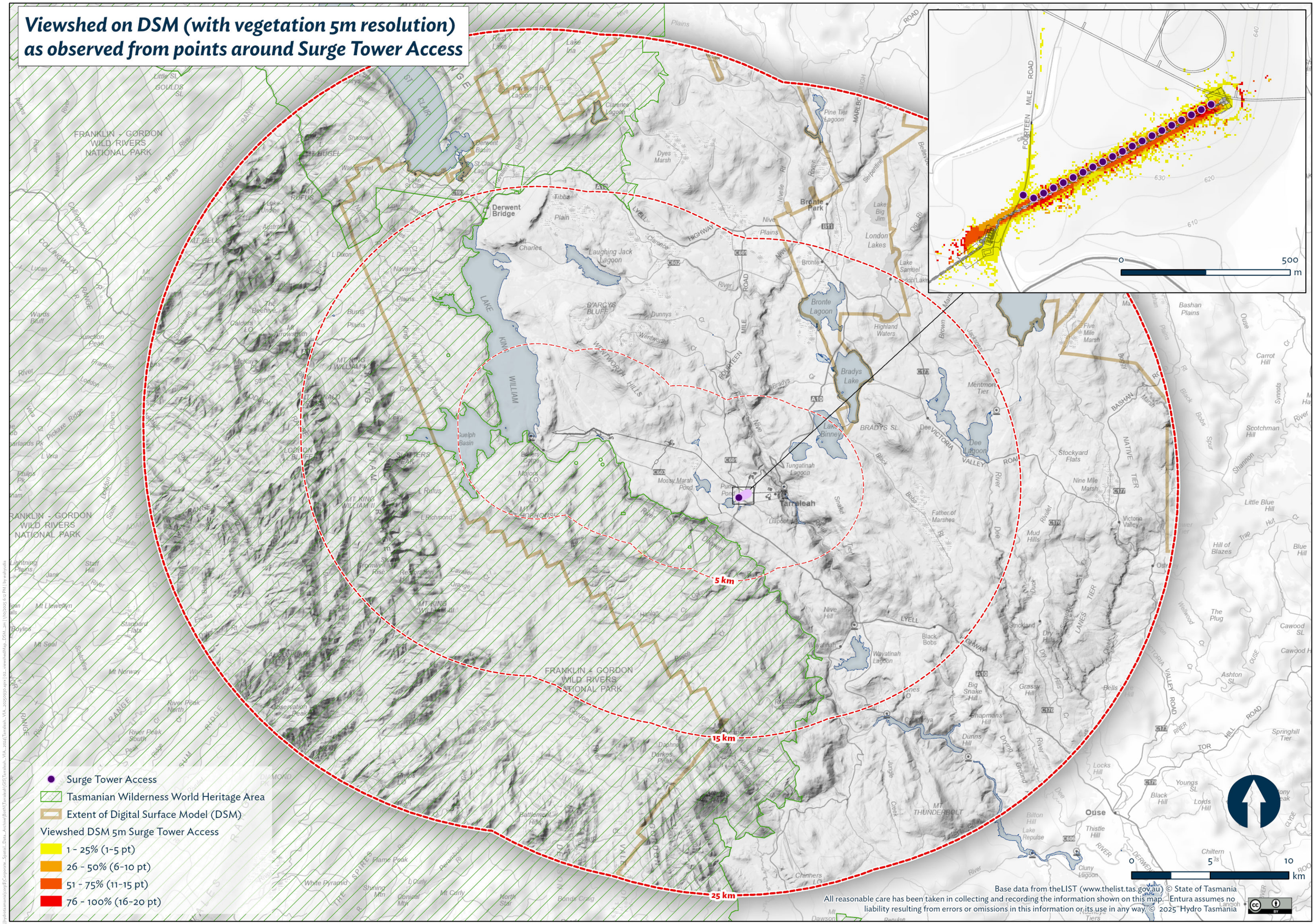
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Surge Access Tunnel Portal Work area



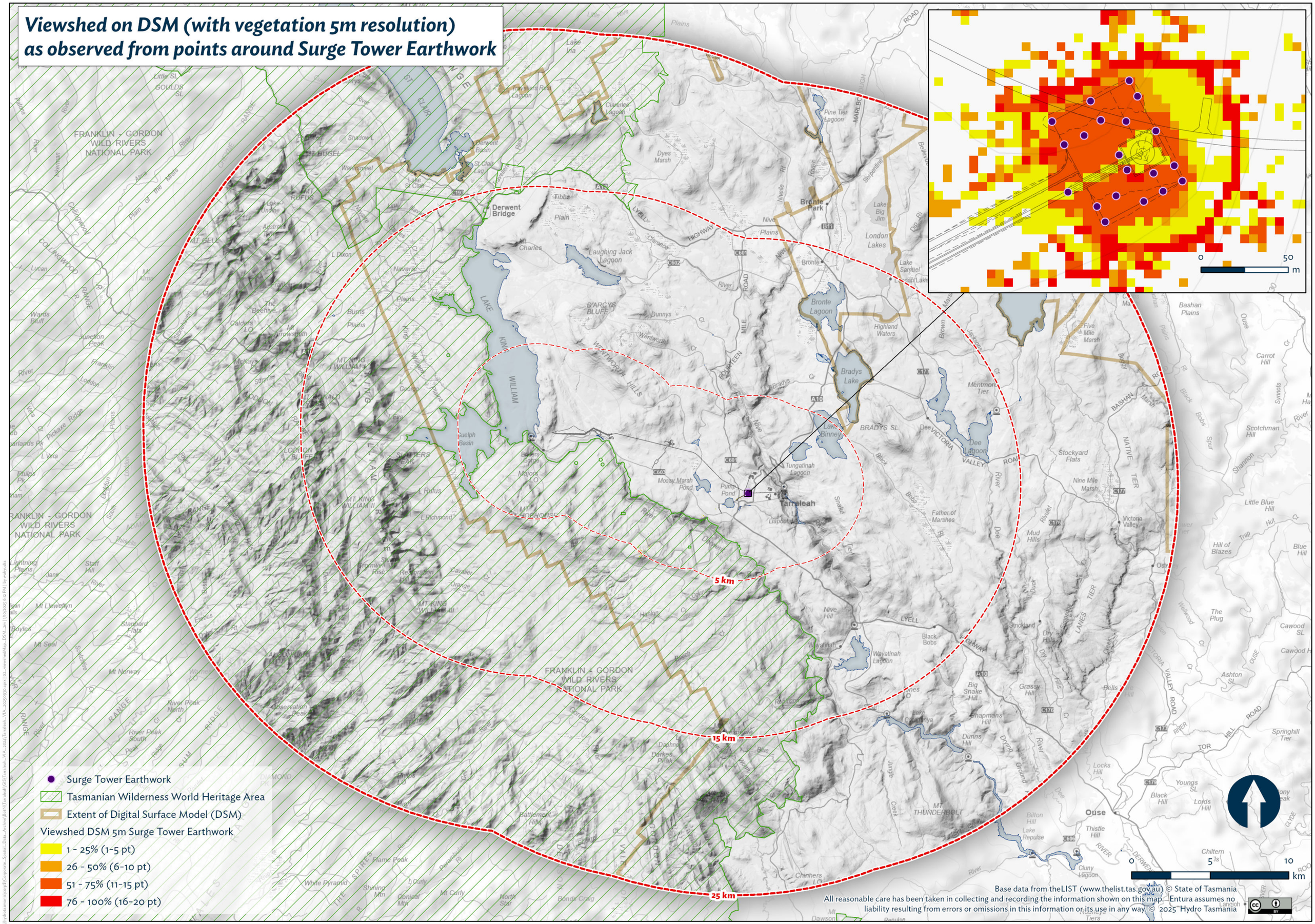
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Surge Tower



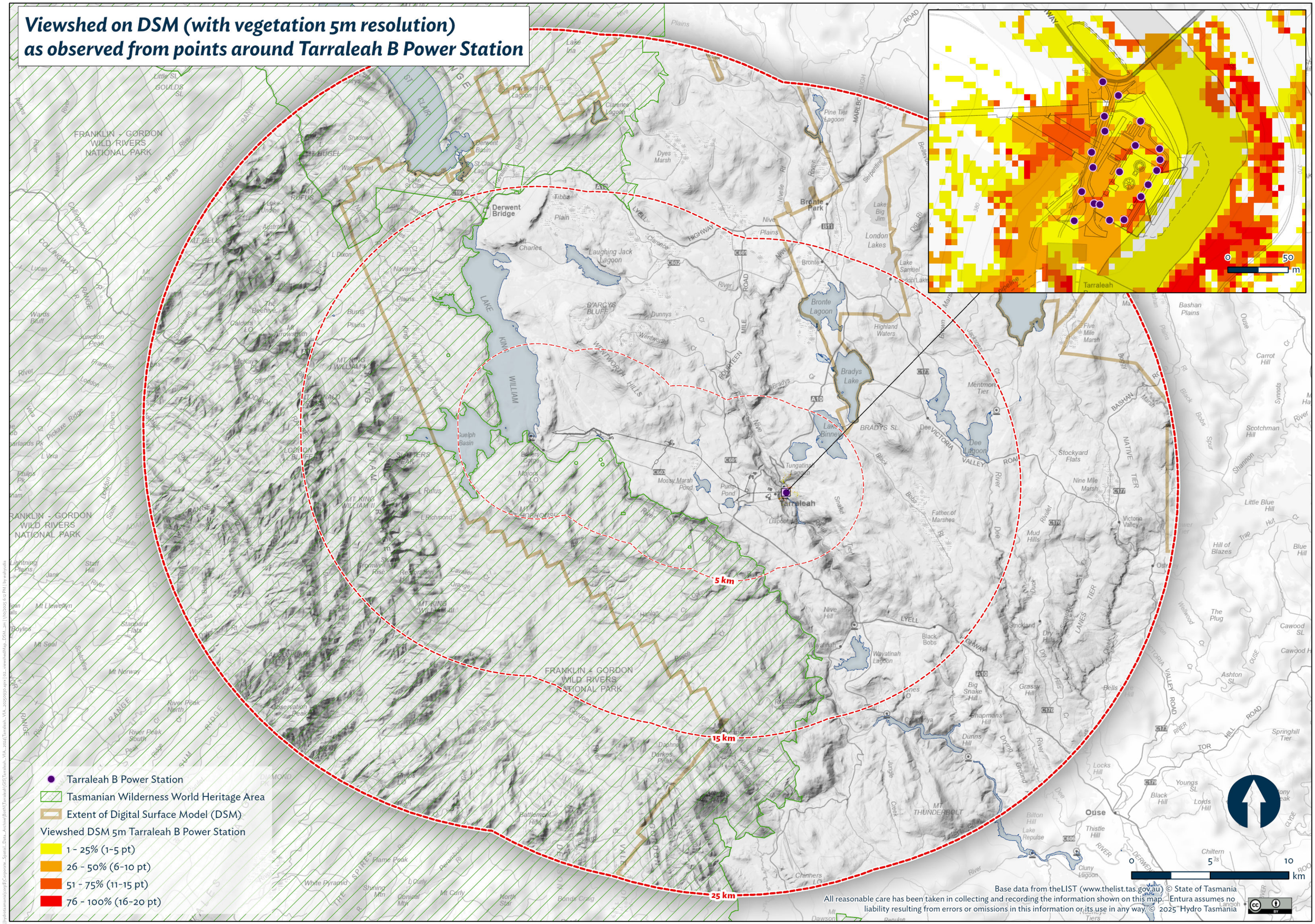
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Surge Tower Access



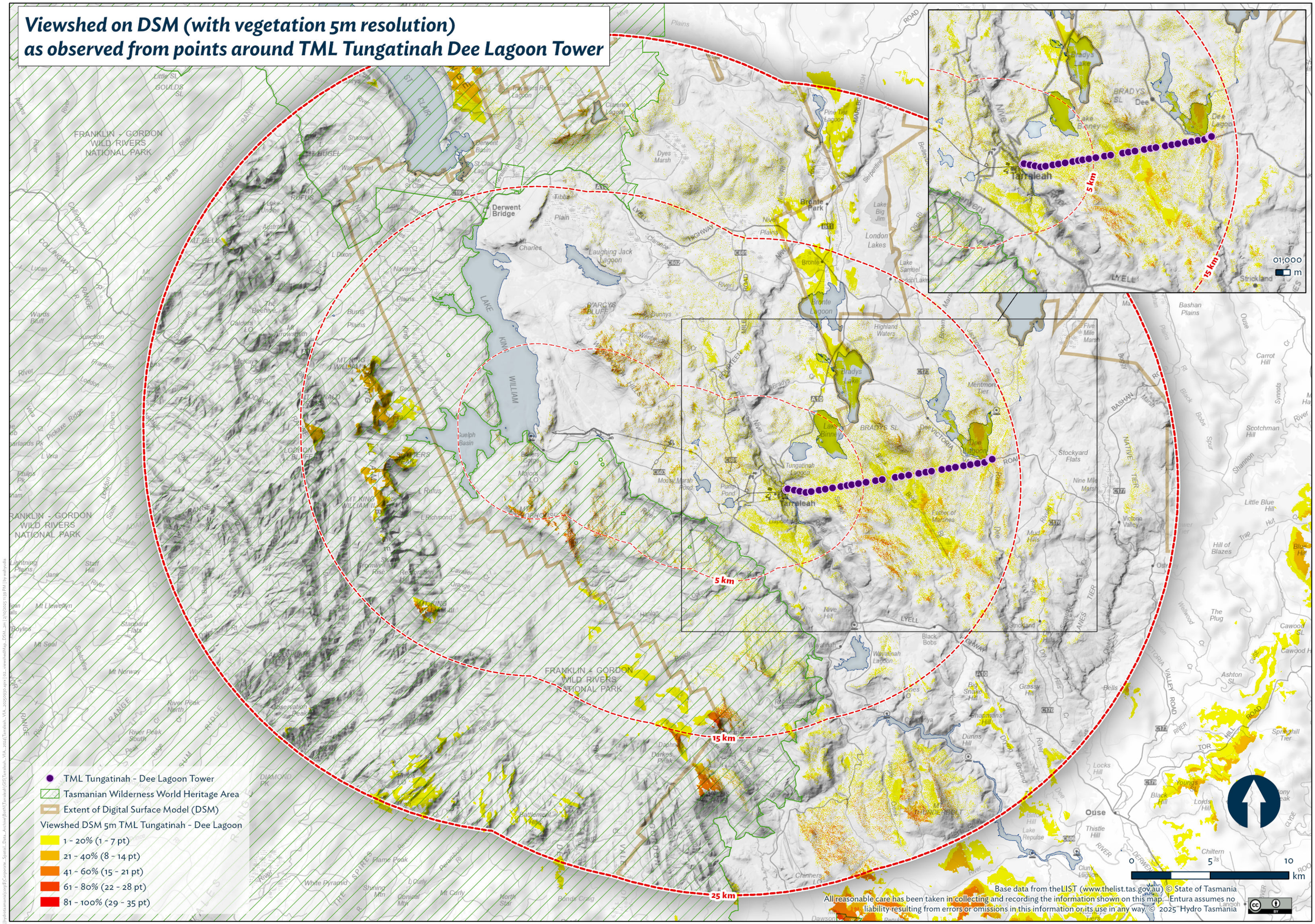
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Surge Tower Earthwork



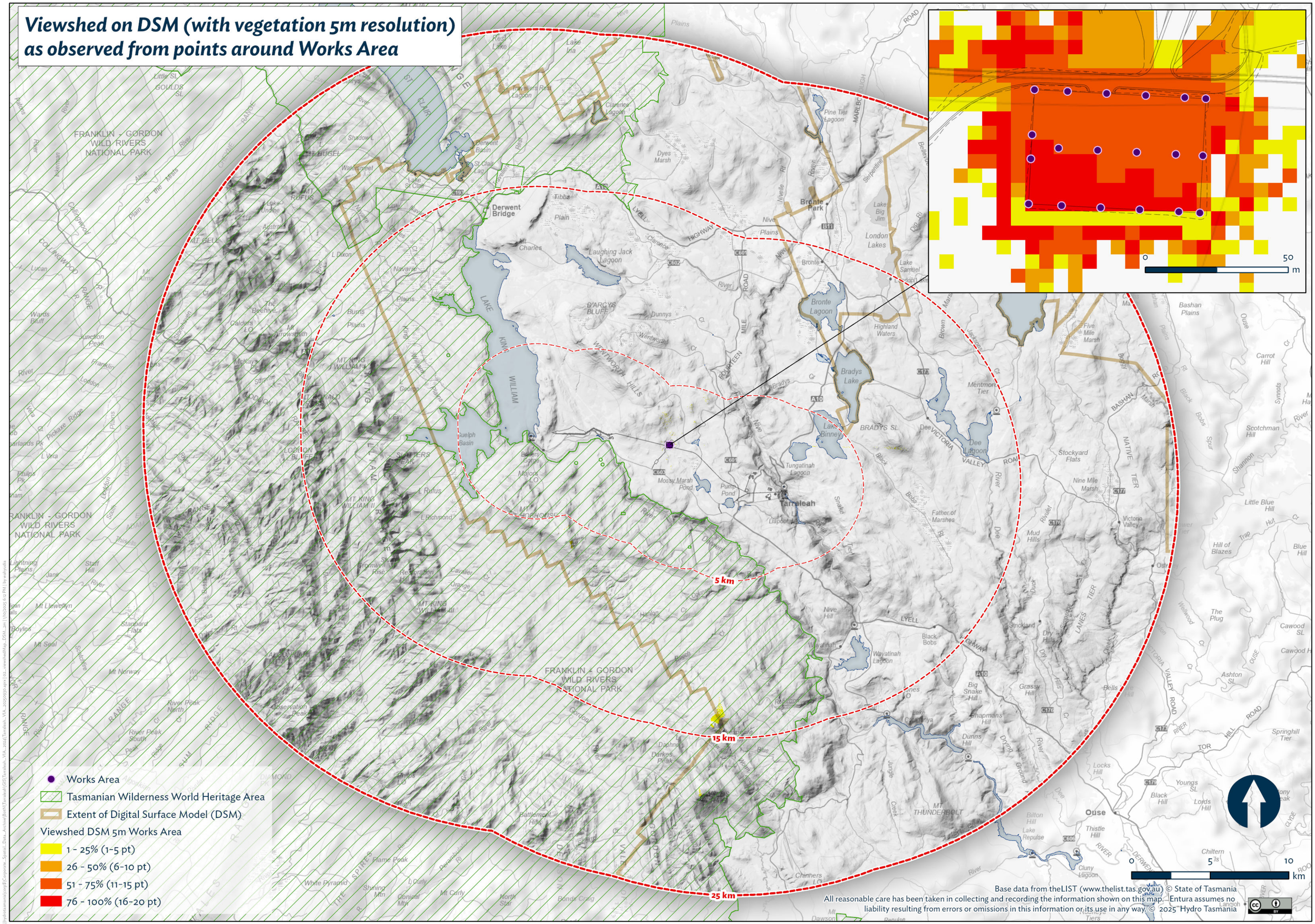
Viewshed on DSM (with vegetation 5m resolution) as observed from points around Tarraleah B Power Station



Viewshed on DSM (with vegetation 5m resolution) as observed from points around TML Tungatinah Dee Lagoon Tower



Viewshed on DSM (with vegetation 5m resolution) as observed from points around Works Area



ATTACHMENT E PHOTOMONTAGES

Source: Entura

Hydro Tasmania

BotN - Tarraleah Visual Simulations

Surge Tower

BotN - Visual Simulations Tarraleah

Hydro Tasmania aims to ensure that stakeholders involved in the project are able to develop an informed view of the project and its visibility from known public access sites. To assist this, Hydro Tasmania have prepared these visual images to simulate the new surge tower proposed for the site location at Tarraleah.

Visual Simulation

This viewpoint pack prepared by Hydro Tasmania contains visual simulations of the proposed infrastructure to provide stakeholders with information about the scale and form of new infrastructure from viewpoints surrounding the location. All visual simulations have been generated using the software package WindPRO 4.0 published by EMD International.

Visual simulation is the process of making a composite image by combining elements of real imagery and 3D digitalization. Its primary purpose is to accurately portray a proposed activity modification or change within a landscape. Visual simulations are useful when assessing developments that produce change to a landscape by providing realistic 'before and after' depictions.

At each viewpoint the photographs are captured along with a number of environmental parameters and accurate geographic data. These components are then used to calibrate the photo to ensure realistic perspective and lighting on the rendered infrastructure models.

The simulations within this viewpoint pack are intended for use at the viewpoints shown.
All of the images should be printed at A3 and viewed at arm's length.
They are designed to provide a reasonable impression of the proposed project infrastructure when viewed in this way.

The image should be viewed at a comfortable arm's length (approximately 500mm) and viewed normally with both eyes. The page should obscure any foreground not visible within the photomontage itself. This enables the photomontage to be directly compared within the wider context of the real landscape.

Visualisations have inherent limitations. For example :

- A visualisation can never show exactly what the proposed infrastructure will look like in reality due to different lighting, weather and seasonal conditions which vary through time.
- The images will give a reasonable impression of the scale of the infrastructure and the distance to the infrastructure, but can never be 100% accurate.
- A static image cannot convey solar panel reflections of glare due to changing light and angles of the sun.

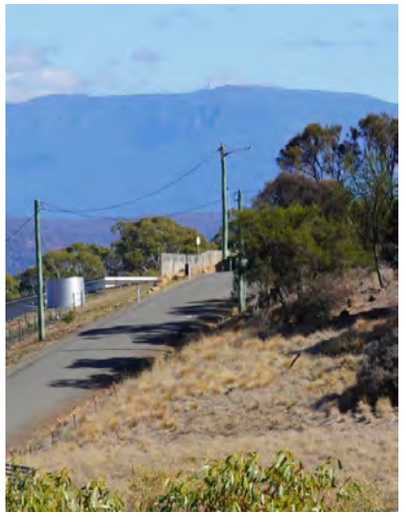
It is important to bear these limitations in mind when assessing the proposed development and to use as much other information as possible to reach a conclusion on the likely landscape and visual impacts.

BotN - Visual Simulations Tarraleah

Visual Simulation process

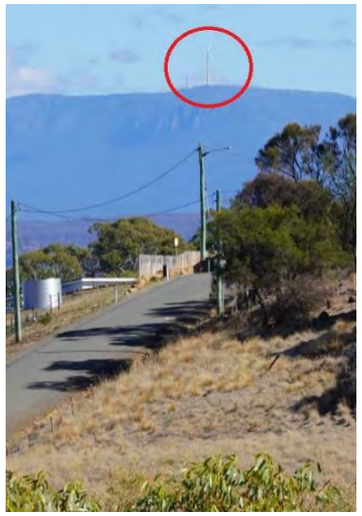
These images to the right show the key stages of the visual simulation process

- Capture the imagery & control points
- Calibrate photo to terrain & control points
- Render with new infrastructure on top of photograph



Capture

Calibrate

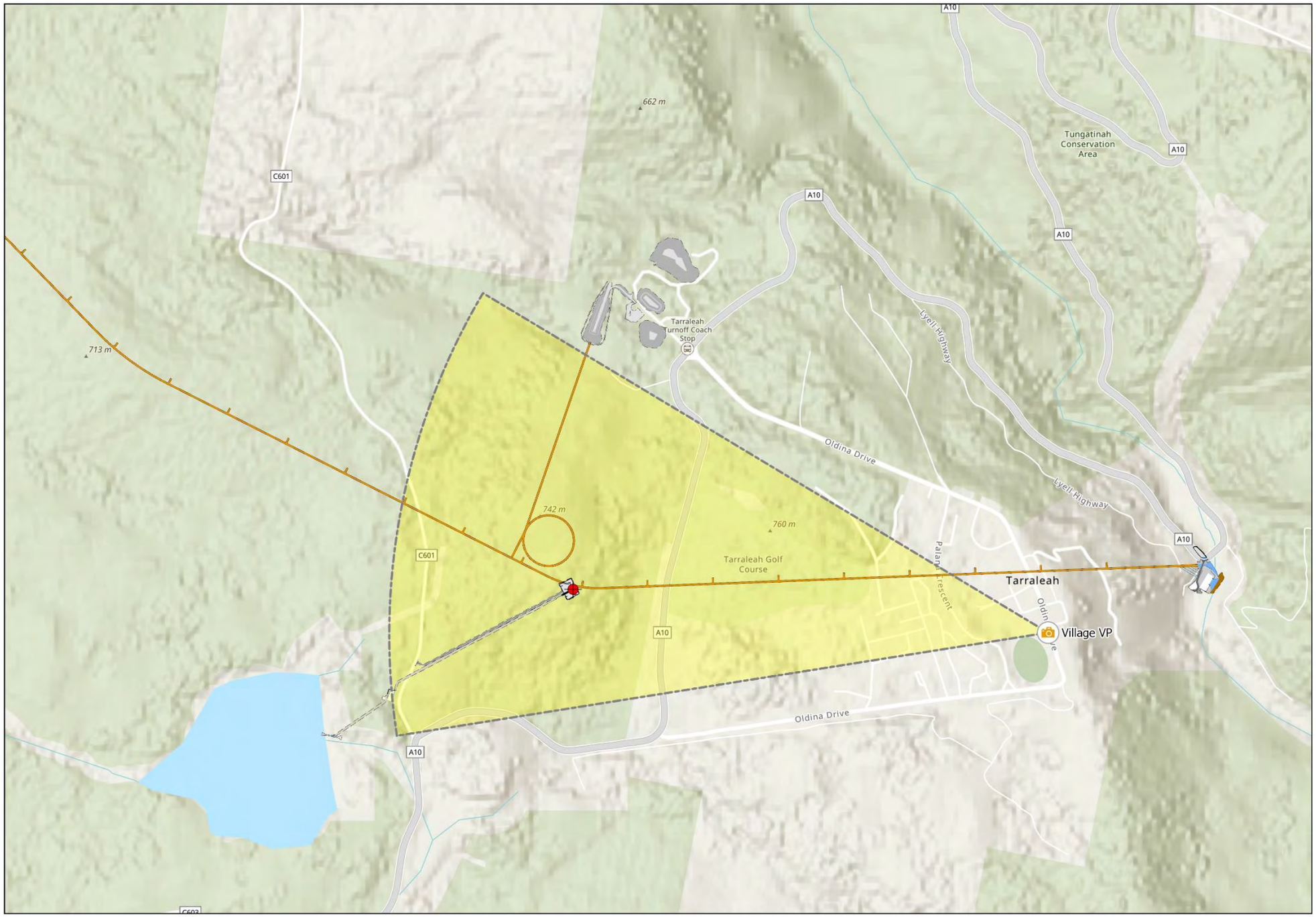


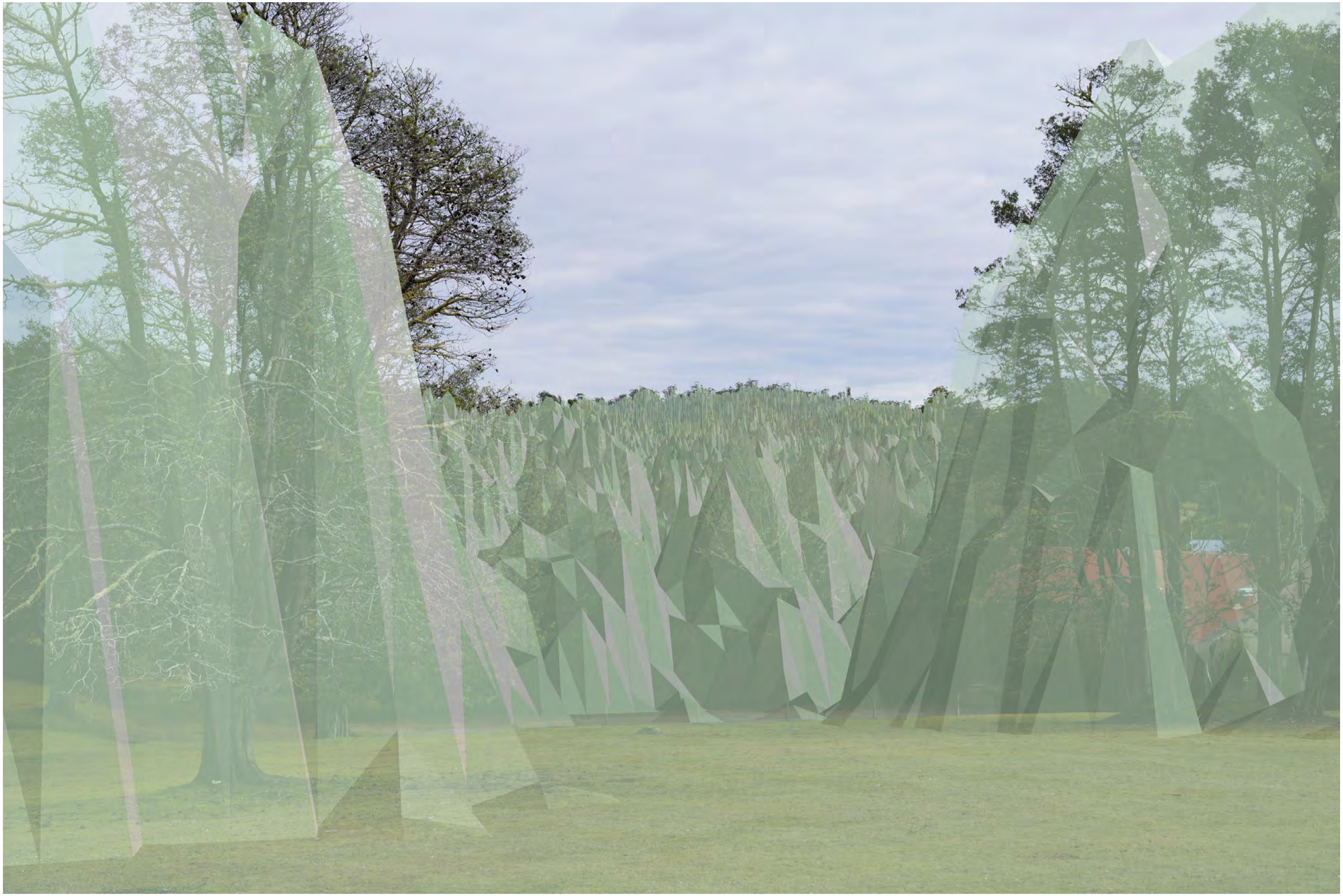
Render

Viewpoint locations

The viewpoints of all the visual simulations contained within this viewpoint pack are shown on the map to the left.
The coordinates for each viewpoint are stated on each individual visual simulation.
The visual simulation should be viewed when standing at the viewpoint location.

BotN - Visual Simulations
Oldina Drive – Village viewpoint





BotN – Tarraleah Surge Tower Calibration
Oldina Drive – view from Village

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 454,716m
Northing: 5,316,528m
Elevation: 600.00m
Photo Bearing : 281°

Date: 06/07/2023
Time: 11:21 AM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 41.1°

Distance : 1.815 km

BotN – Tarraleah Surge Tower Visual Simulation
Oldina Drive – view from Village

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 454,716m
Northing: 5,316,528m
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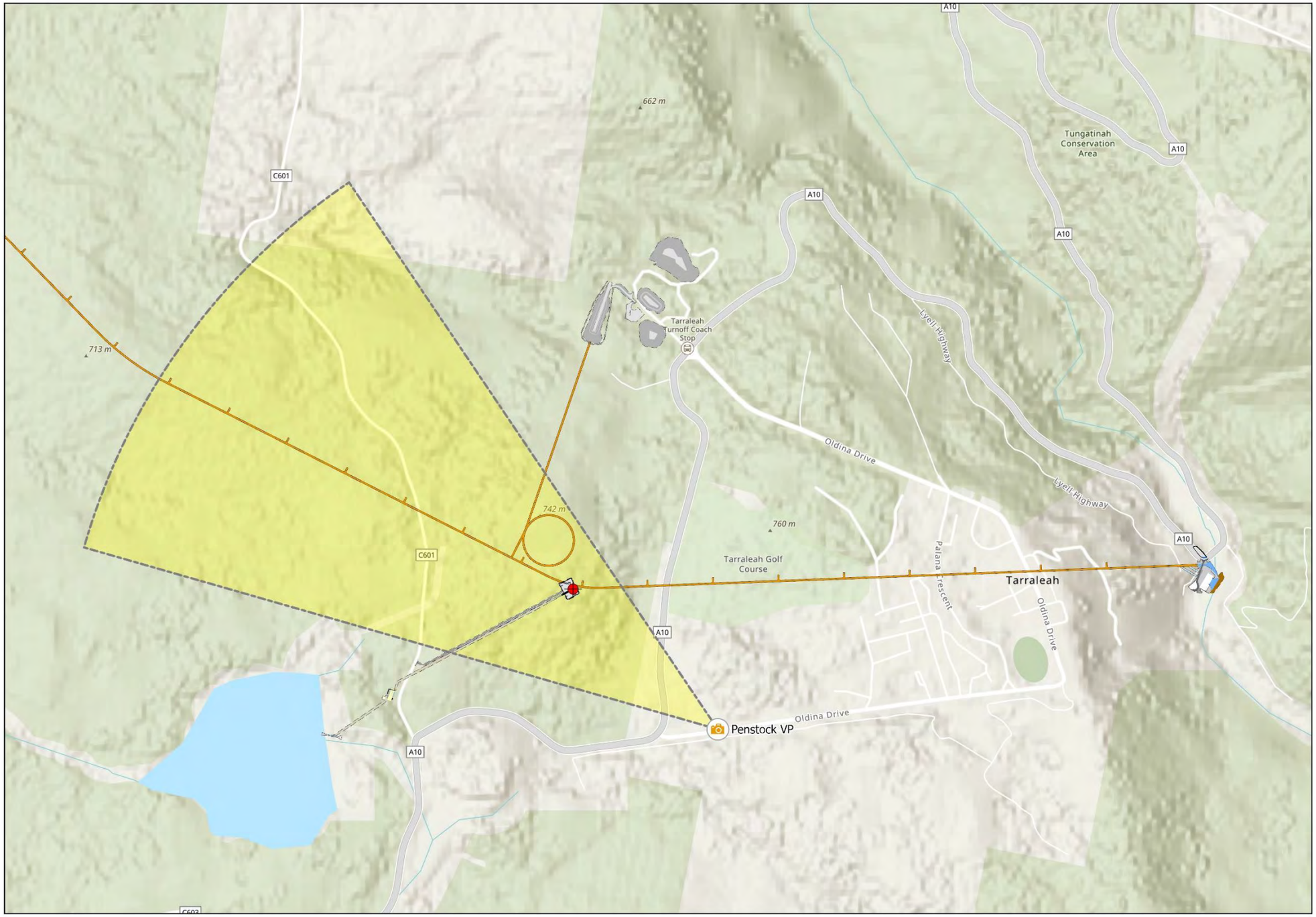
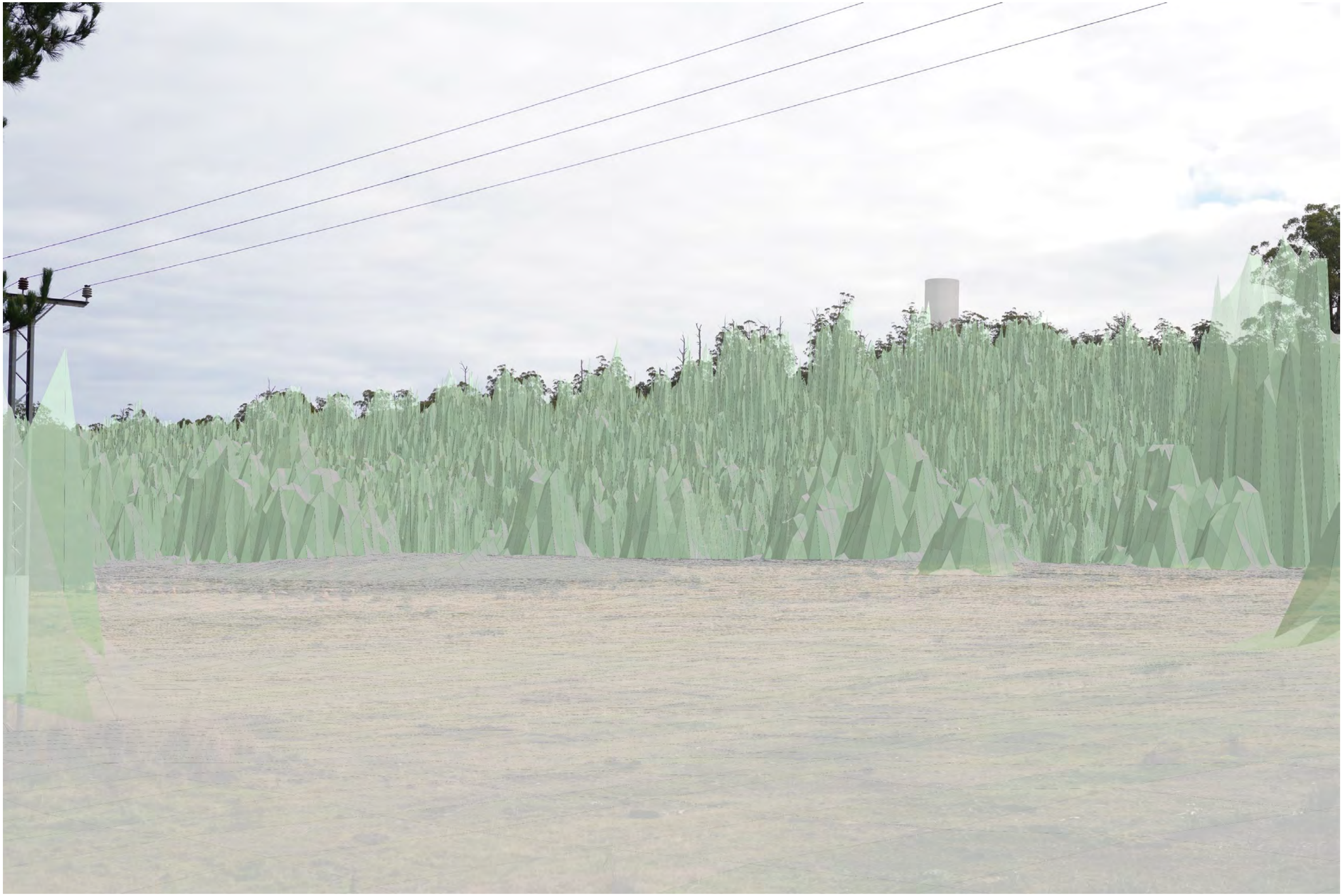
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 41.1°

Distance : 1.815 km

BotN - Visual Simulations
Oldina Drive – Penstock viewpoint





BotN – Tarraleah Surge Tower Calibration
Oldina Drive – view from beside Penstocks

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 453,464m
Northing: 5,316,162m
Elevation: 602.6m
Photo Bearing : 306°

Date: 06/07/2023
Time: 11:38 AM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.0°

Distance : 0.765 km

BotN – Tarraleah Surge Tower Visual Simulation
Oldina Drive – view from beside Penstocks

Recommended viewing distance when viewed with both eyes is 550mm

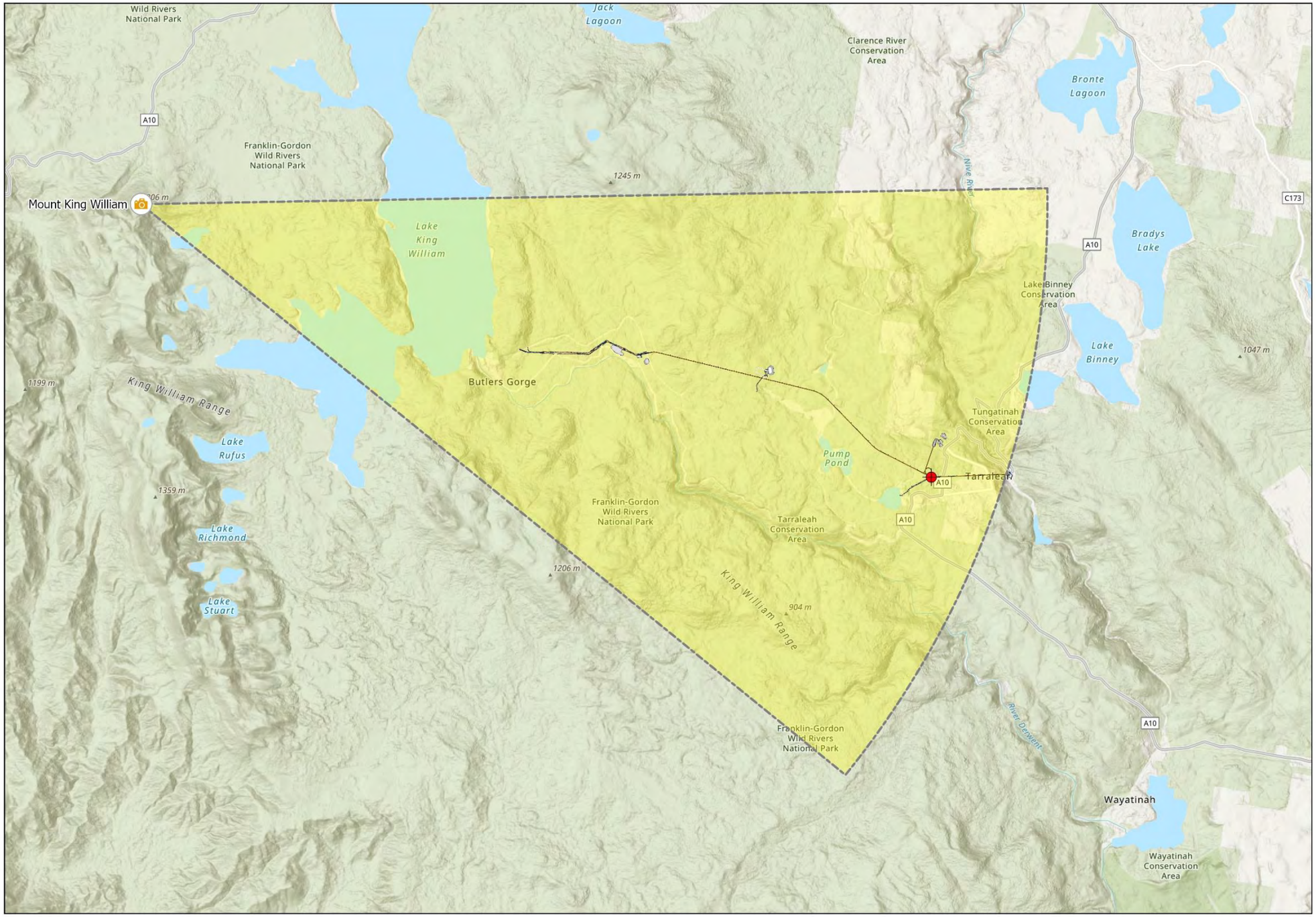
Easting: 453,464m
Northing: 5,316,162m
Elevation: 602.6m
Photo Bearing : 306°

Date: 06/07/2023
Time: 11:38 AM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.0°

Distance : 0.765 km

BotN - Visual Simulations
Mount King William viewpoint



BotN – Tarraleah Surge Tower Calibration
View from Mount King William

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 428,933m
Northing: 5,316,162m
Elevation: 1326.0m
Photo Bearing : 109°

Date: 24/01/2024
Time: 12:23 PM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.3°

Distance : 25.35 km

BotN – Tarraleah Surge Tower Visual Simulation
View from Mount King William

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 428,933m
Northing: 5,316,162m
Elevation: 1326.0m
Photo Bearing : 109°

Date: 24/01/2024
Time: 12:23 PM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.3°

Distance : 25.35 km

BotN – Tarraleah Surge Tower Visual Simulation
View from Mount King William

Recommended viewing distance when viewed with both eyes is 550mm

Easting: 428,933m
Northing: 5,316,162m
Elevation: 1326.0m
Photo Bearing : 109°

Date: 24/01/2024
Time: 12:23 PM
Weather: Partial cloud cover
Visibility: Normal

Camera: Canon EOS 5D Mark IV
Camera Height: 1.65m
Focal Length (35mm eq.): 50mm
Hz FOV: 40.3°

Distance : 25.35 km