3.2.2 Theoretical limit of viewshed extent

The study area extents are determined by the Theoretical limit of viewshed extent (TLVE). This is a standard measure that determines the distance from proposed project infrastructure at which the vertical height of the proposed project infrastructure occupies a specified percentage of the vertical field of view.

'Human Factors in Design' (Dreyfuss, 1960)[1] provides guidance with respect to the field of view of the human eye, and describes a normal horizontal and vertical field of view as comprising approximately 60 degrees (horizontal) and 20 degrees (vertical).

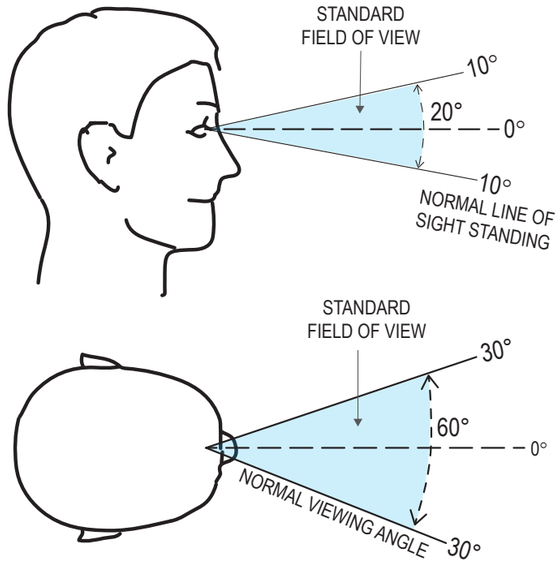

Figure 8 Field of view diagram

Noting the ZTV description in the previous section, in the absence of intervening topographical features which would otherwise limit the extent of a particular viewshed, it is theoretically possible for a computer-modelled viewshed to have an infinite extent. To address this, in circumstances where topography does not provide a limit to viewshed extent, a limitation can be applied on the basis of the known characteristics of the human eye field of view. The 3D terrain model used to determine the TLVE does take into account earth curvature, and the photomontages prepared to inform the assessment also allow for curvature of the earth in the modelling which underpins their preparation.

1 'Human Factors in Design', Dreyfuss 1960

For this LVIA, an assumption has been made that any object which occupies less than 5% of the human eye vertical field of view (equivalent to 1 degree) is unlikely to result in an unacceptably-high visual impact, due to the relatively small proportion of the total field of view it would occupy.

A 1-degree vertical angle measured from an origin point to a horizontal distance of 1 kilometres yields a height at that distance of 17m above the level of the origin point. Conversely, an object of that height, at a distance of 1 kilometres from an origin point (or viewing point) would occupy a vertical field of view not greater than 1 degree (or 5% of the vertical field of view).

Within these extents, potential sensitive receptors are identified as having a range of visual exposure ranging from 'very low' to 'very high'. This relationship can hence be applied to any structure with a vertical height and used to determine an appropriate viewshed extent.

Within these extents, sensitive receptors are identified. The project components have been considered from the nearest representative sensitive view location which would represent a 'worst-case' parameter. Where sensitive receptors are identified within these extents, the project component is considered to have a 'potential visual impact'.

Assumptions in relation to TLVE extent are tested through a review of photomontages. If the photomontages depict a magnitude of visual impact greater than anticipated, particularly for viewpoints at the outer edges of the study area, the study area will be expanded and an assessment will be done of representative viewpoints at a greater distance.

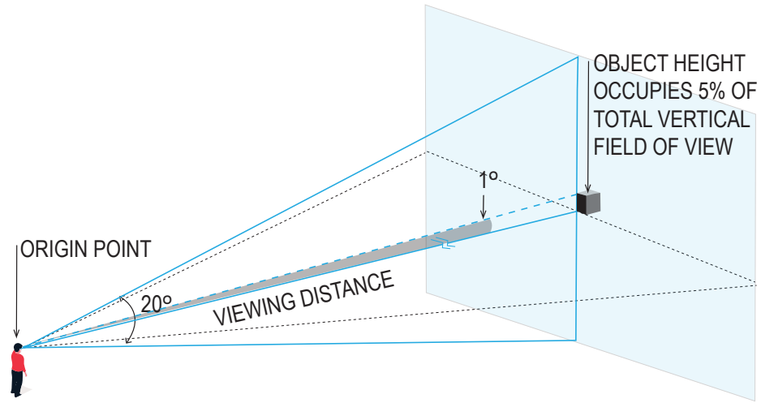

Figure 9 Theoretical limit of viewshed extent diagram

3.3 Landscape and Visual Impact assessment

A change to baseline conditions (or the no-project case) caused by project activities in any of the project phases (construction, operation or decommissioning) may give rise to impacts.

The impact assessment involves identifying the severity, extent and duration of any impacts, that the project may have on the existing environment, through consideration of landscape visual sensitivity (determined on the basis of the identified landscape value and its degree of visual exposure to proposed project infrastructure), the magnitude of visibility of the proposed infrastructure (as depicted within the photomontage views) and the nature, number and frequency of visual receptors.

The impact assessment considers the 'worst case' design outcome for this discipline, which may vary across other assessment topics.

The significance of the impacts has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the government terms of reference established to guide the assessments.

The report documents the approach to the LVIA undertaken by Hansen Partnership and has been based on industry best practice as articulated by key reference documents, including *Guidelines for Landscape & Visual Impact Assessment,* British Landscape Institute, 2013*, Visual Landscape Planning in Western Australia,* Western Australian Planning Commission, 2009*,* Environment Protection and Heritage Council, 2010 and *Guidance Note for Landscape & Visual Assessment,* Australian Institute of Landscape Architects, 2018[1][2][3]. The Western Australian Guidelines is considered the most relevant LVIA guideline to the local context in the absence of a Victorian document. The UK publications are broadly accepted as the basis for LVIA theory and terminology.

The nature of receptors (viewers), the quantum, duration and frequency of views - per view location - is considered and forms part of the assessment.

The impact assessment considers day time, with photomontages prepared using daytime photos.

The final impact assessment as determined on the basis of impacts assessed at each representative viewpoint is arrived at on the basis of three variables:

- Landscape visual sensitivity (determined on the basis of the identified landscape value and its degree of visual exposure to proposed project infrastructure);
- Magnitude of visibility of the proposed infrastructure (as depicted within the photomontage views from representative view locations), and
- The nature, number and frequency of visual receptors.

1 *Visual Landscape and Planning in Western Australia, a Manual for Evaluation, Assessment, Siting and Design*, Department for Planning and Infrastructure, November 2007
2 *Guidelines for Landscape and Visual Impact Assessment*, British Landscape Institute, Third Edition, 2013
3 *Note for Landscape & Visual Assessment,* Australian Institute of Landscape Architects, 2018

3.3.1 Magnitude of visibility

In adopting a series of criteria for assessing the magnitude of visibility of project infrastructure visible from representative view locations, as depicted within photomontage imagery, it is important to define a range of terms which provide some indication of the extent to which a view location may be impacted upon visually by the project, and when mitigation measures are considered necessary.

In determining this range a grading system of visual magnitude categories is described below.

Very High: entailing close proximity in an exposed location incapable of effective mitigation, where the proposed structures occupy a significant proportion of the view and are visually-dominant.

High: where the proposed structures form a major element in the view. There will be a tendency for proposed structures to be more dominant than other landscape elements.

Moderate: where proposed structures will typically be visible, sometimes obviously so. Notwithstanding this, the distance of project infrastructure from the viewpoint and/or the contribution to visual screening provided by topography, vegetation or the curvature of the earth, results in situations where proposed structures will not be a dominant element in the view.

Low: where proposed structures are visible but form only minor elements in available views as a result of distance and/or screening by vegetation, topography or earth curvature.

Very Low/Negligible: where proposed structures are visible in clear conditions and may be recognisable, but conversely may sometimes not even be noticed.

Nil: where proposed structures are entirely screened from view by topography, vegetation or other existing structures, and hence not visible. In circumstances where the magnitude of visibility is assessed as nil, the overall impact assessment is also considered to be nil, regardless of the assessed level of landscape visual sensitivity and receptor sensitivity.

3.3.2 Visual receptors

Consistent with guidance provided within the *Landscape Institute and Institute of Environmental Management & Assessment, Guidelines for Landscape Visual Impact Assessment, Third Edition, 2013,* consideration of visual receptors is necessary, in order to identify and understand who will be affected by visual amenity impacts resulting from the project. Visual receptors can include:

- People living within the study area;
- People working within the study area;
- People travelling through the study area;
- People visiting recognised landscapes or attractions within the study area, and
- People engaged in recreational activities within the study area.

It is recognised that people have differing responses to changes in views and visual amenity depending on the context and purpose for being in a particular place. It is generally accepted that changes to views and visual amenity which affect a workplace are typically perceived as being of a lower order of impact than changes which affect a recognised landscape or attraction. It is also generally accepted that changes to views and visual amenity which affect a private residence are typically perceived as being of a higher order of impact by the occupants of that residence, but not necessarily by a broader audience.

The impact assessment incorporates a weighting in order to ensure an appropriate level of consideration of the perception of the particular receptors who will see and experience the changes to views and visual amenity, outlined as follows:

Nature of receptor - visitors to the Alpine National Park, which is part of the Australian Alps National Parks and Reserves National Heritage Place, are assumed to have a very high level of sensitivity to visual impacts. Visitors to the Mount Hotham and Falls Creek Alpine Resorts are assumed to have a high level of sensitivity to visual impacts, as are visitors to other recognised scenic destinations (such as designated lookouts and/or areas with statutory protection on the basis of landscape value/significance), with other receptors in the public realm assumed to have a moderate level of sensitivity to visual impact. Receptors in their regular place of work, and undertaking regular work activities, are assumed to have a low level of sensitivity to visual impact;

Number of receptors - relative visitation numbers are considered, using the rationale that viewpoints which experience higher levels of visitation are assumed to experience higher levels of visual impact;

Frequency of receptors - the frequency of visits to a viewpoint by individual receptors is considered, using the rationale that a visual impact which is experienced more frequently is likely to be felt more significantly. For example, a receptor who experiences a view daily is considered to experience a greater level of impact than a receptor who only experiences it once a year or less. This rationale underpins the assumption that private residents are more sensitive to impacts felt at their place of residence where they might spent entire days, because they travel to and from that location more frequently, and

Duration of receptors - the period of time which receptors typically spend at a viewpoint is considered, with longer durations assumed to result in higher levels of visual impact. This rationale also underpins the assumption that private residents are more sensitive to impacts felt at their place of residence, and supports an assumption that short-term views - such as those experienced from moving vehicles - would be associated with lower levels of visual impact.

3.4 Limitations, uncertainties and assumptions

Several technical limitations and assumptions have been relied upon in order to assess the impact of this proposal. These are detailed below:

Existing conditions

The existing conditions on which the study area was formed was based upon 10m DEM map data from ELVIS (Elevation and Depth - Foundation Spatial Data). This data is assumed to be a current representation of existing conditions.

Viewshed Extents

Viewshed extents are determined based upon the geographical extent of DEM map data provided by ELVIS (Elevation and Depth - Foundation Spatial Data). Where the geographical area of extents of this data is limited and is also within the determined LVIA study area, a 'worst-case parameter' approach has been adopted and these areas are assumed to fall within the viewshed extents i.e. assumed to be 'potentially visible'.

4 GUIDELINES FOR ASSESSMENT

The LVIA has been undertaken with due regard for the Significant Impact Criteria outlined and described in the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (2013). For National Heritage places, the significant impact criteria are described as follows:

An action is likely to have a significant impact on the National Heritage values of a National Heritage place if there is a real chance or possibility that it will cause:

- one or more of the National Heritage values to be lost
- one or more of the National Heritage values to be degraded or damaged, or
- one or more of the National Heritage values to be notably altered, modified, obscured or diminished.

4.1 The relevant National Heritage Values

With regard to LVIA, the relevant National Heritage Values of the Australian Alps National Parks and Reserves, as gazetted, comprise the following:

Criterion:

The place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.

Values:

The AANP is a powerful, spectacular and distinctive landscape highly valued by the Australian community. The mountain vistas, including distinctive range upon- range panoramas, snow covered crests, slopes and valleys, alpine streams and rivers, natural and artificial lakes, the snow-clad eucalyptus and the high plain grasslands, summer alpine wildflowers, forests and natural sounds evoke strong aesthetic responses. Much of the terrain of the AANP is highly valued for its remoteness, and naturalness, including views to and from the region that capture snow clad ranges and mountain silhouettes against clear skies as well as expansive views of natural landscapes from the high points of the Alps.

The upper Snowy River and Snowy Gorge, Mount Buffalo, the Kosciuszko Main Range, Lake Tali Karng, Dandongadale Falls the peaks and ridges between and including Mt Cobbler, Mt Howitt and the Bluff and other high peaks, ridgelines, granite outcrops and escarpments are examples of dramatic awe-inspiring landscapes. Recreational pursuits in these landscapes are enhanced by aesthetic appreciation of their wild and natural quality.

Snow-covered eucalypts, huts in mountain settings and mountain landscapes are distinctive Australian images captured by numerous artists and photographers. The mountain landscapes have inspired poets, painters, writers, musicians and film makers.

In order to assess – through an LVIA - the potential for project infrastructure associated with the Falls to Hotham Alpine Crossing to have a significant impact on the National Heritage values described above, Hansen Partnership has undertaken engagement with the key stakeholder (Parks Victoria) to understand the anticipated nature, form and scale of proposed project infrastructure, completed site investigations over 5 days in December 2021, prepared indicative 3-dimensional built form typologies for proposed infrastructure and utilised these in the preparation of accurate photomontage imagery to demonstrate and assess the potential visual impacts of proposed project infrastructure (in a preliminary conceptual form) upon the landscape and its National Heritage values.

5 VIEWSHED ANALYSIS

5.1 Introduction

Viewshed analysis mapping was undertaken on the basis of topographical data to understand the theoretical extent of the viewsheds of each overnight node and of 12 key viewpoints within the Alpine National Park and the alpine resort areas of Falls Creek and Mount Hotham.

The purpose of viewshed analysis mapping is to identify and map all land within the project study area from which views of the proposed location for one or more overnight nodes are potentially available. It is important to note that the viewshed analysis mapping represents a 'worst case scenario' with respect to visual exposure, on the basis that it only considers topographic information and does not incorporate vegetation, which will typically provide for screening (to varying degrees) of built elements within the landscape.

5.2 Viewshed analysis mapping

Viewshed analysis mapping - to determine the potential visual exposure of landscapes and seascapes within the study area to proposed project infrastructure. The results of that mapping are provided in Figures 9-22 on the following pages.

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Project Ref: 24.0583
Dwg No.: LVIA-3
Scale 1:60,000
Date: 03/12/2024
Revision: P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
OVERNIGHT NODE 1
Viewpoint at Operated Platform

Figure 10 Viewshed Analysis - OVERNIGHT NODE 1

Bungalow Spur Walking Track
Mt Feathertop
Diamantina Spur
River Camp
Diamantina
OVERNIGHT NODE 3
OVERNIGHT NODE 2
Westons Hut
Blairs Hut
Harrietville
The Razorback
Red Robin Battery
Tawonga Huts
KIEWA RIVER
PRETTY VALLEY CREEK
ROCKY VALLEY CREEK
PRETTY VALLEY PONDAGE
Heathy Spur Track
Lake Side
Falls Creek
Rocky Valley Storage
Marum Point Track
Langford Gap Hut
Bogong Rover Scout Chalet
OVERNIGHT NODE 1
Cope Hut
COPE CREEK
MIDDLE CREEK
BOGONG HIGH PLAINS ROAD
Faithfull Hut
Young Hut
BUNDARA RIVER
Dibbins Hut
Diamantina Hut
Loch Carpark
Mt Hotham
DARGO RIVER
GREAT ALPINE ROAD
COBUNGRA RIVER
McNamara Hut
(Dinner Plain Hut)

LEGEND
- Main Road
- Secondary Road
- Existing track/trail
- FHAC on existing track
- Existing popular dispersed camping area
- Existing contour (100m interval)
- Viewshed generation point
- Potential Visual Exposure
- Waterbody
- Overnight Nodes

0 2.5km 5km

hansen

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Scale	1:60,000
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Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
OVERNIGHT NODE 2
Viewpoint at Operated Huts
(5.2m above GL)

Figure 11 Viewshed Analysis - OVERNIGHT NODE 2

Bungalow Spur Walking Track
Mt Feathertop
Diamantina Spur
River Camp
OVERNIGHT NODE 3
Diamantina
OVERNIGHT NODE 2
Westons Hut
Blairs Hut
Harrietville
The Razorback
Red Robin Battery
Tawonga Huts
KIEWA RIVER
PRETTY VALLEY CREEK
PRETTY VALLEY PONDAGE
ROCKY VALLEY CREEK
Heathy Spur Track
Lake Side
Falls Creek
Rocky Valley Storage
Marum Point Track
Langford Gap Hut
Bogong Rover Scout Chalet
OVERNIGHT NODE 1
Cope Hut
COPE CREEK
MIDDLE CREEK
BOGONG HIGH PLAINS ROAD
Faithfull Hut
Young Hut
BUNDARA RIVER
Dibbins Hut
Diamantina Hut
Loch Carpark
Mt Hotham
DARGO RIVER
GREAT ALPINE ROAD
COBUNGRA RIVER
McNamara Hut
(Dinner Plain Hut)

LEGEND
- Main Road
- Secondary Road
- Existing track/trail
- FHAC on existing track
- Existing popular dispersed camping area
- Existing contour (100m interval)
- Viewshed generation point
- Potential Visual Exposure
- Waterbody
- Overnight Nodes

0 2.5km 5km

hansen

Project Ref: 24.0583
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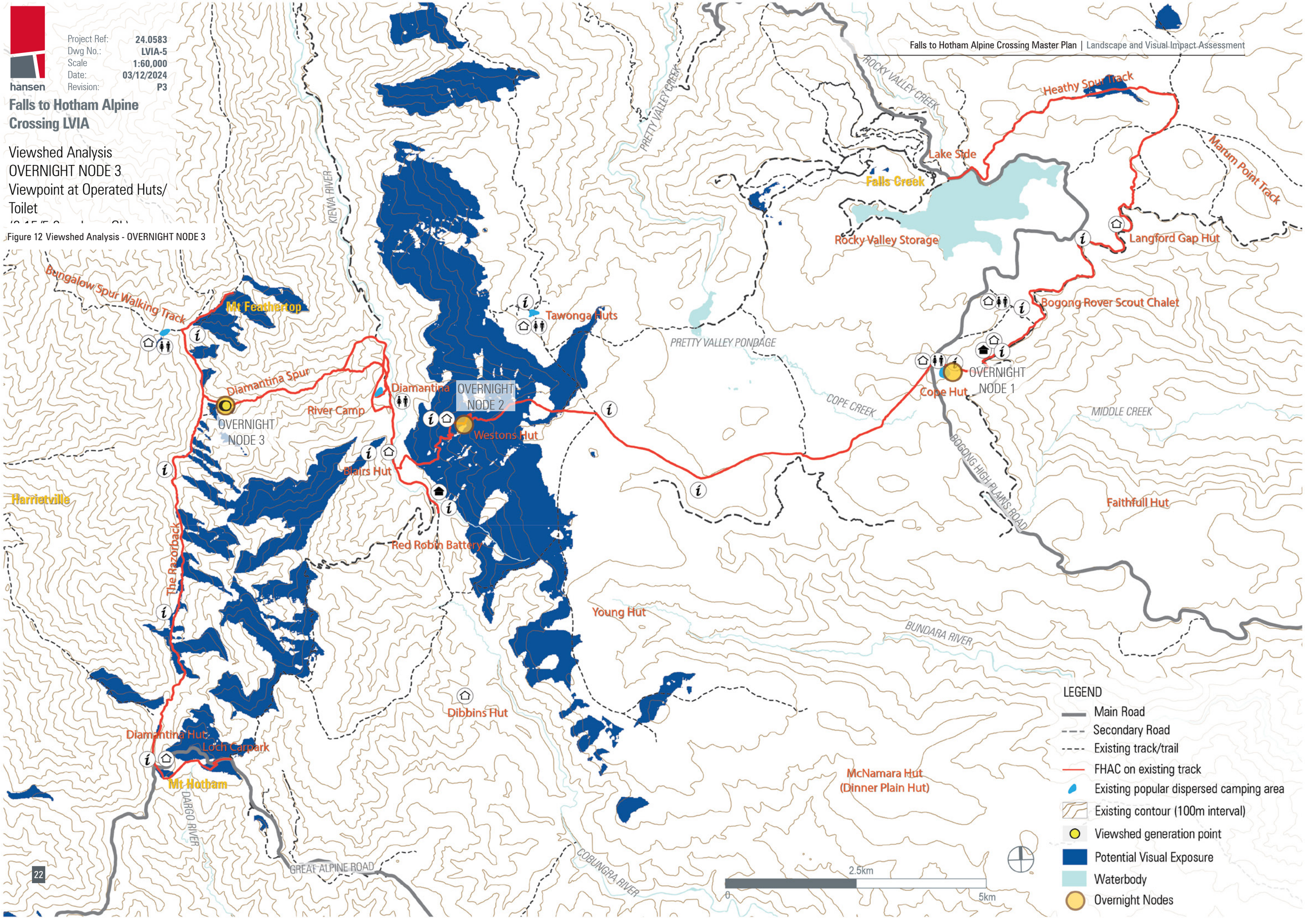
Scale 1:60,000
Date: 03/12/2024
Revision: P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
OVERNIGHT NODE 3
Viewpoint at Operated Huts/ Toilet
(3.15/5.3m above GL)

Figure 12 Viewshed Analysis - OVERNIGHT NODE 3



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Project Ref:	24.0583
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Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
VANTAGE POINT 1 -
Razorback Trailhead

Figure 13 Viewshed Analysis - VANTAGE POINT 1 Razorback Trailhead

Heathy Spur Track
Marum Point Track
Lake Side
Falls Creek
Rocky Valley Storage
Langford Gap Hut
Bogong Rover Scout Chalet
OVERNIGHT NODE 1
Cope Hut
Tawonga Huts
Bungalow Spur Walking Track
Mt Feathertop
Diamantina Spur
River Camp
Diamantina
OVERNIGHT NODE 2
Westons Hut
OVERNIGHT NODE 3
Blairs Hut
Harrietville
The Razorback
Red Robin Battery
Dibbins Hut
Young Hut
Faithfull Hut
Diamantina Hut
Loch Carpark
Mt Hotham
McNamara Hut (Dinner Plain Hut)
KIEWA RIVER
PRETTY VALLEY CREEK
ROCKY VALLEY CREEK
PRETTY VALLEY PONDAGE
COPE CREEK
MIDDLE CREEK
BOGONG HIGH PLAINS ROAD
BUNDARA RIVER
DARGO RIVER
GREAT ALPINE ROAD
COBUNGRA RIVER

LEGEND
- Main Road
- Secondary Road
- Existing track/trail
- FHAC on existing track
- Existing popular dispersed camping area
- Existing contour (100m interval)
- Viewshed generation point
- Potential Visual Exposure
- Waterbody
- Overnight Nodes

0 2.5km 5km

hansen

Project Ref:	24.0583
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Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
VANTAGE POINT 2 -
Mt Loch Car Park

Figure 14 Viewshed Analysis - VANTAGE POINT 2 Mt Loch Car Park

Heathy Spur Track
Marum Point Track
Lake Side
Falls Creek
Rocky Valley Storage
Langford Gap Hut
Bogong Rover Scout Chalet
OVERNIGHT NODE 1
Cope Hut
Tawonga Huts
OVERNIGHT NODE 2
Westons Hut
Diamantina
River Camp
Diamantina Spur
OVERNIGHT NODE 3
Bungalow Spur Walking Track
Mt Feathertop
Blairs Hut
Red Robin Battery
Harrietville
The Razorback
Dibbins Hut
Young Hut
Faithfull Hut
Diamantina Hut
Loch Carpark
Mt Hotham
McNamara Hut
(Dinner Plain Hut)
PRETTY VALLEY CREEK
ROCKY VALLEY CREEK
KIEWA RIVER
PRETTY VALLEY PONDAGE
COPE CREEK
MIDDLE CREEK
BOGONG HIGH PLAINS ROAD
BUNDARA RIVER
DARGO RIVER
GREAT ALPINE ROAD
COBUNGRA RIVER

LEGEND
- Main Road
- Secondary Road
- Existing track/trail
- FHAC on existing track
- Existing popular dispersed camping area
- Existing contour (100m interval)
- Viewshed generation point
- Potential Visual Exposure
- Waterbody
- Overnight Nodes

0 2.5km 5km

hansen

Project Ref:	24.0583
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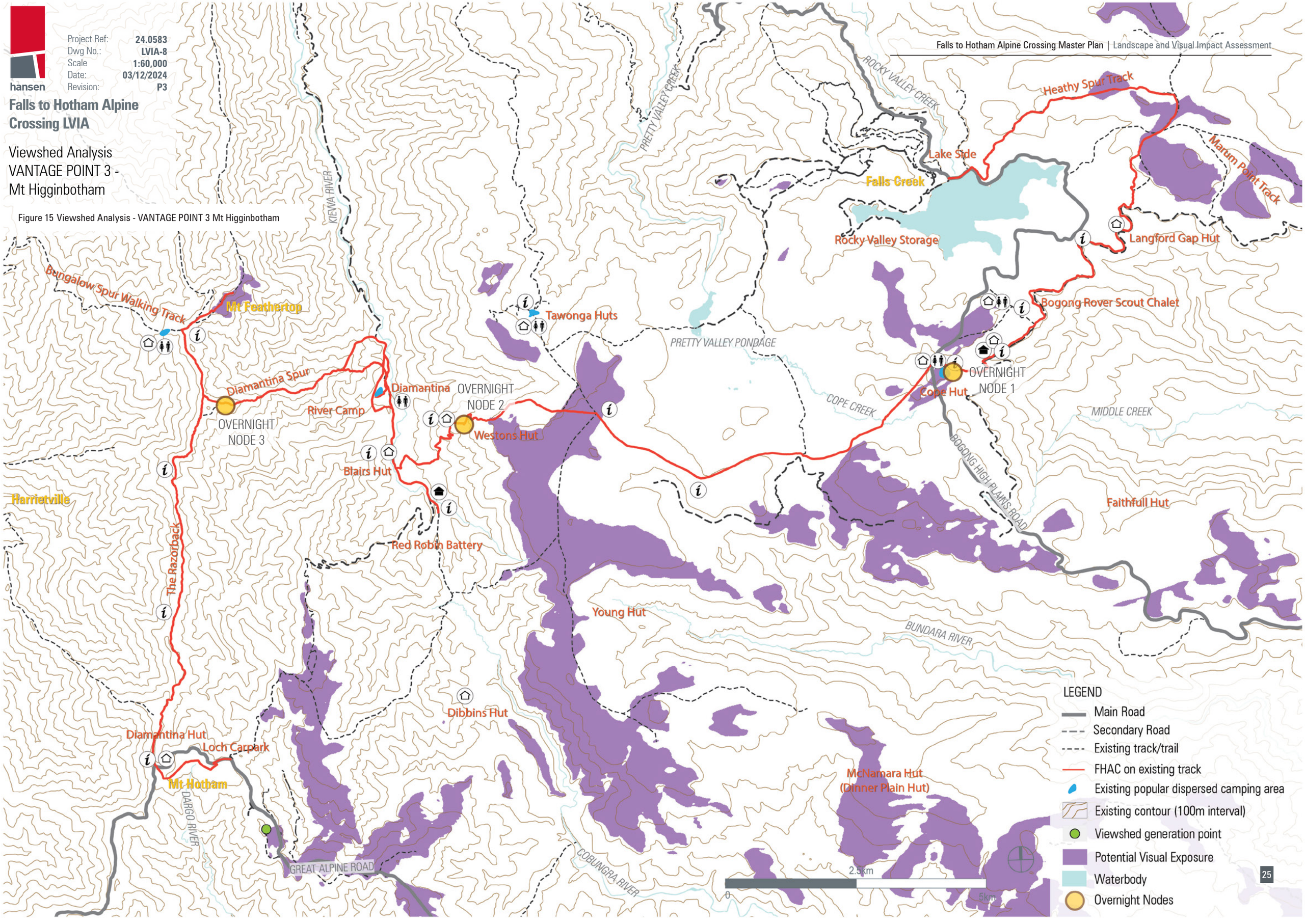
Scale	1:60,000
Date:	03/12/2024
Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis VANTAGE POINT 3 - Mt Higginbotham

Figure 15 Viewshed Analysis - VANTAGE POINT 3 Mt Higginbotham



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Scale	1:60,000
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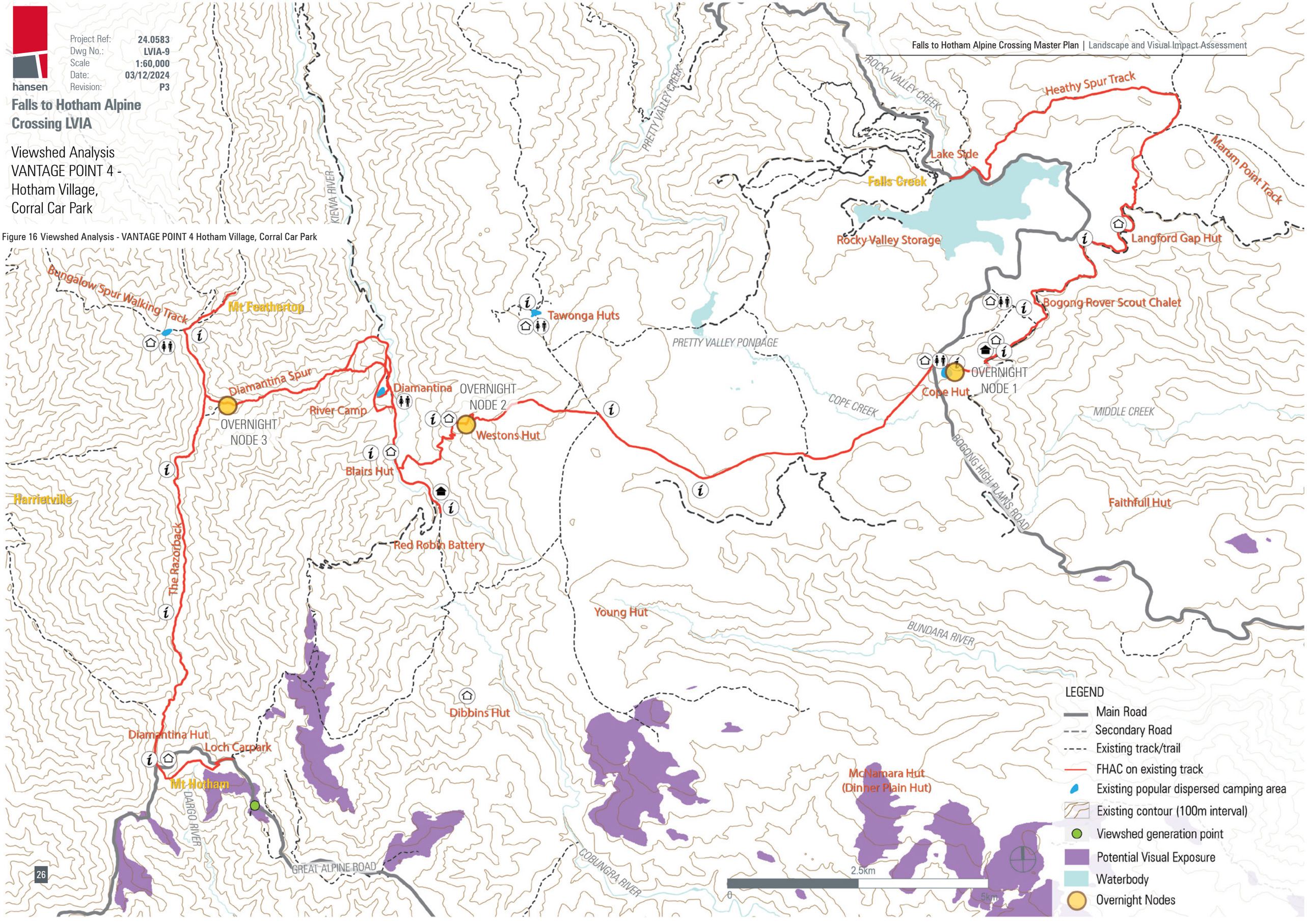
Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis
VANTAGE POINT 4 -
Hotham Village,
Corral Car Park

Figure 16 Viewshed Analysis - VANTAGE POINT 4 Hotham Village, Corral Car Park



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Project Ref:	24.0583
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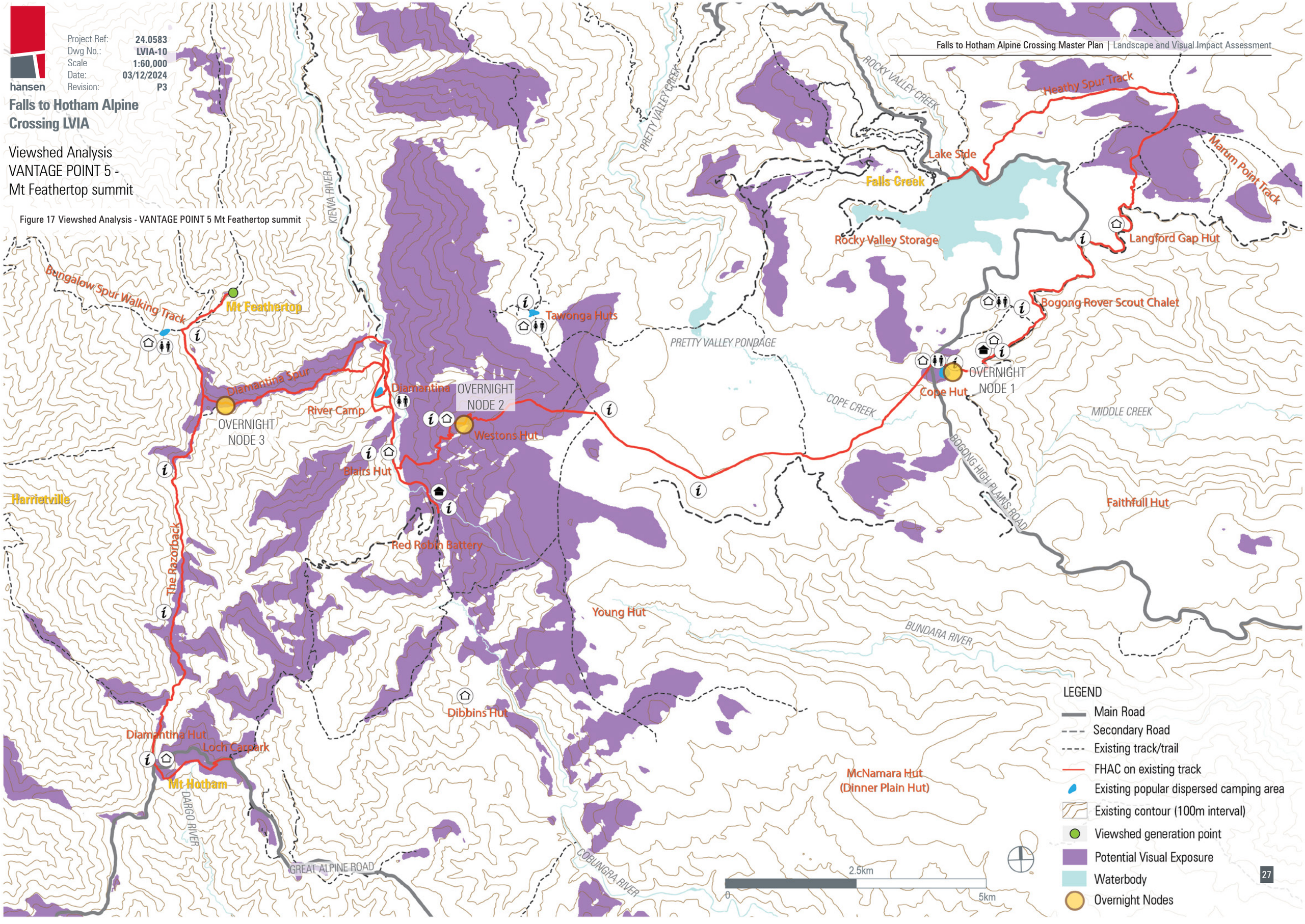
Scale	1:60,000
Date:	03/12/2024
Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis VANTAGE POINT 5 - Mt Feathertop summit

Figure 17 Viewshed Analysis - VANTAGE POINT 5 Mt Feathertop summit



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Project Ref:	24.0583
Dwg No.:	LVIA-11
Scale	1:60,000
Date:	03/12/2024
Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis VANTAGE POINT 6 - Westons Hut

Figure 18 Viewshed Analysis - VANTAGE POINT 6 Westons Hut

Bungalow Spur Walking Track
Mt Feathertop
Diamantina Spur
Diamantina River Camp
OVERNIGHT NODE 3
Tawonga Huts
OVERNIGHT NODE 2
Westons Hut
Blairs Hut
Red Robin Battery
Dibbins Hut
Harrietville
The Razorback
Diamantina Hut
Loch Carpark
Mt Hotham
DARGO RIVER
GREAT ALPINE ROAD
COBUNGRA RIVER
KIEWA RIVER
PRETTY VALLEY CREEK
ROCKY VALLEY CREEK
PRETTY VALLEY PONDAGE
Heathy Spur Track
Lake Side
Falls Creek
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Cope Hut
COPE CREEK
MIDDLE CREEK
BOGONG HIGH PLAINS ROAD
Faithfull Hut
Young Hut
BUNDARA RIVER
McNamara Hut (Dinner Plain Hut)

LEGEND
- Main Road
- Secondary Road
- Existing track/trail
- FHAC on existing track
- Existing popular dispersed camping area
- Existing contour (100m interval)
- Viewshed generation point
- Potential Visual Exposure
- Waterbody
- Overnight Nodes

0 2.5km 5km

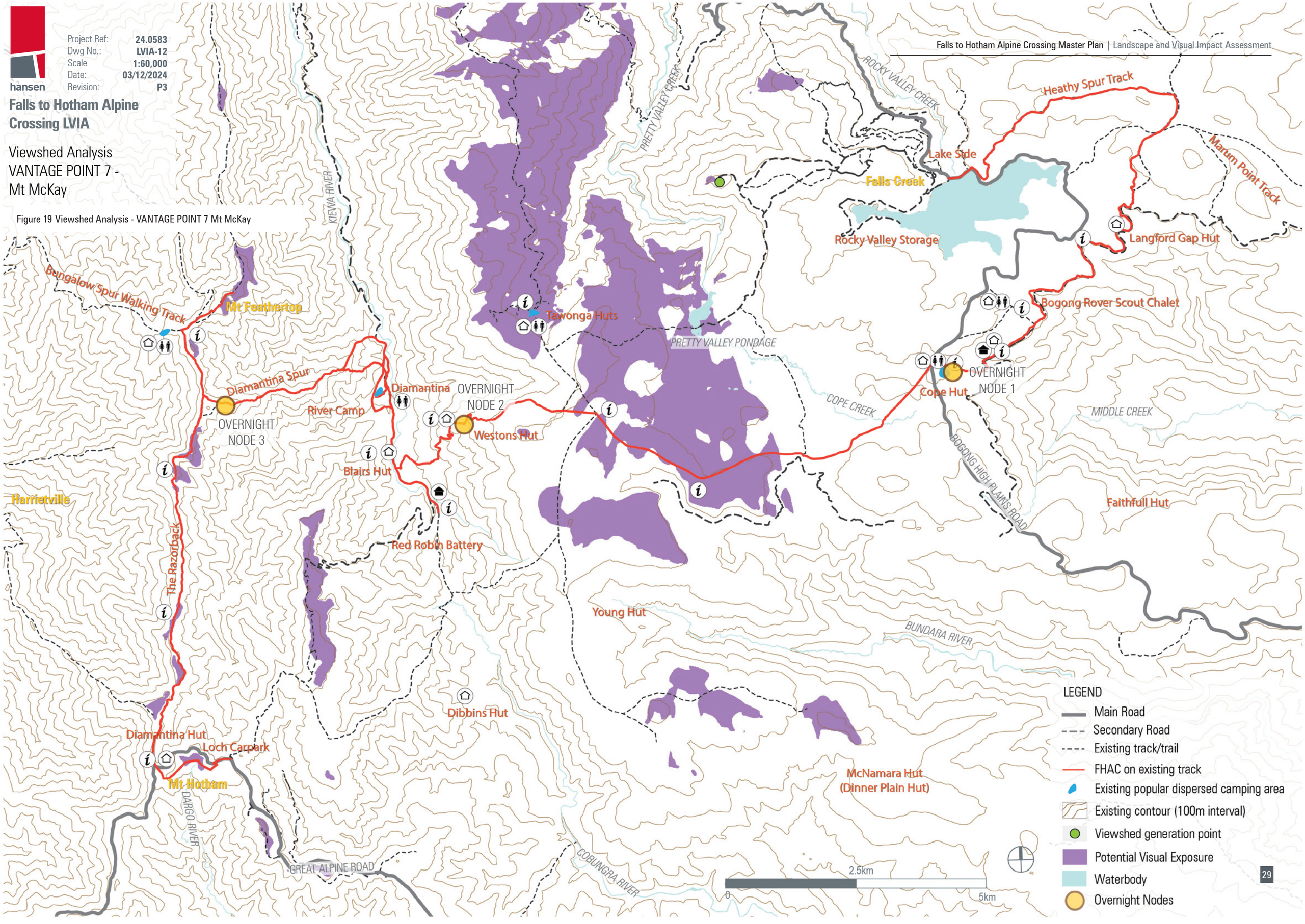
hansen

Project Ref:	24.0583
Dwg No.:	LVIA-12
Scale	1:60,000
Date:	03/12/2024
Revision:	P3

Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis VANTAGE POINT 7 - Mt McKay

Figure 19 Viewshed Analysis - VANTAGE POINT 7 Mt McKay



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Falls to Hotham Alpine Crossing LVIA

Viewshed Analysis VANTAGE POINT 8 - Falls Creek summit

Figure 20 Viewshed Analysis - VANTAGE POINT 8 Falls Creek summit