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NILLUMBIK
THE GREEN WEDGE SHIRE

Diamond Creek Trail Extension
Trail Alignment
Options Assessment Report

Client // Nillumbik Shire Council
Office // VIC
Reference // 16M1183000
Date // 22/02/16

GTAconsultants

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1. Introduction

1.1 Background

GTA was appointed by Nillumbik Shire Council in September 2015 to undertake a strategic justification study for the proposed extension of the Diamond Creek Trail.

The existing (off road) Diamond Creek Trail runs from Yarra Park in Eltham to Diamond Creek Park in Diamond Creek and is approximately 12km in length. The trail is currently used mainly for recreational purposes.

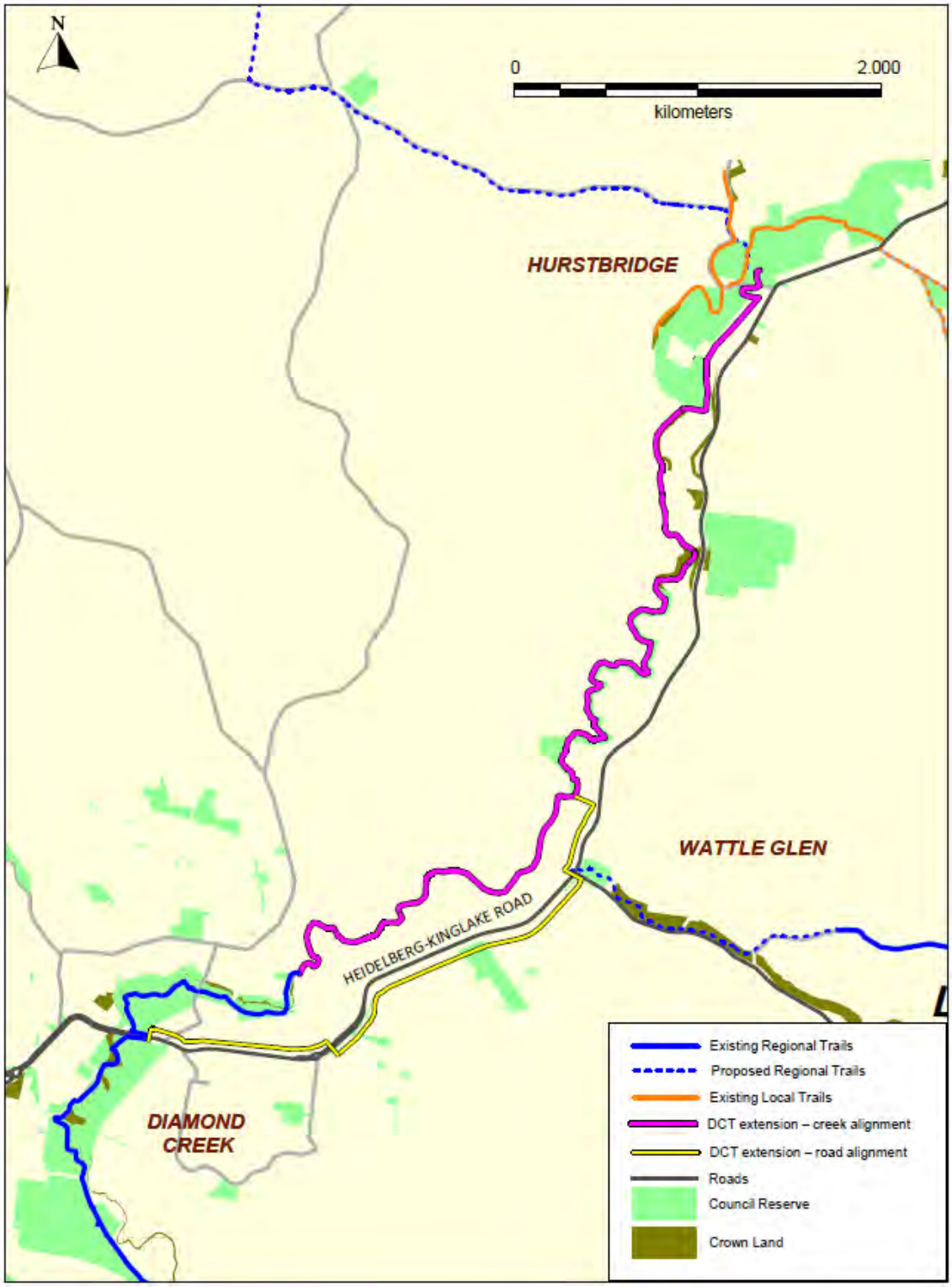
The proposed extension will connect the northern end of the trail in Diamond Creek to Hurstbridge via Wattle Glen and is expected to be approximately 5.5km - 7km in length, depending on the exact alignment.

The various alignment options are as follows:

- Diamond Creek to Wattle Glen - on road cycle lane, road aligned (but off road) trail and creek aligned trail.
- Wattle Glen to Hurstbridge – creek aligned trail. A road aligned trail is not feasible due to insufficient available land to provide a recreational trail.

The proposed alignment options are shown in Figure 1.1.

Figure 1.1: Proposed Diamond Creek Trail Alignment Options



This report considers the costs and benefits of the road/creek aligned and creek aligned trail alternatives between Diamond Creek and Hurstbridge.

1.2 Purpose

This project does not seek to provide a formal business case to justify the investment, however, it will:

- Summarise the strategic justification and basis for the provision of the trail extension, based on existing studies.
- Provide a high level review of key demand side inputs such as population and demographic catchment.
- Set out the benefits likely to be provided by this trail, in the context of the wider network of trails and benefits to the Northern Region provided by a comprehensive trail network.
- Assess which alignment option is likely to generate the greatest benefits for individuals, Council and the community.
- Provide sufficient evidence of the benefits and costs of the trail extension to give Council (and other funding bodies) confidence to make a decision and proceed with delivery of the preferred alignment.
- Briefly consider the alternative creek alignments.

2. Trail Justification

2.1 Policy and Strategy Context

Numerous state, regional and local policy and strategy documents support, and actively advocate for, the proposed trail extension. The trail extension will act as a key link in creating an integrated network with other existing trails. Further, the trail extension will also assist Council to achieve a number of its core objectives.

2.1.1 State

Plan Melbourne, 2014

Plan Melbourne provides high level policy support for improved recreation and transport connections for active transport modes, including through the following sections:

- Objective 4 of the Plan aims to create healthy and active neighbourhoods
- Direction 4.3 promotes people of all ages having access to high-quality health and community facilities

The Diamond Creek Trail extension has the potential to be one of these high-quality facilities as a shared path that can promote health, fitness and active forms of transport.

Further to these health benefits, Plan Melbourne details the concept of a 20 minute neighbourhood, where the community has access to a wide range of facilities and services within 20 minutes of a walking, cycling or public transport journey. Improving walkability, cycling and safety to provide healthier communities is identified as the first principle for local government to consider in assisting to realise the vision of a 20 minute neighbourhood.

Victoria's Cycle Tourism Action Plan 2011-2015

Victoria's Cycle Tourism Action Plan 2011-2015 has been developed by Tourism Victoria to position Victoria as the leading state for cycle tourism, as well as to outline how the Government will leverage and enhance opportunities in cycle tourism. The Plan outlines a range of initiatives aimed at growing cycle tourism in Victoria. The key objectives of the plan are to:

- Strengthen the supply of cycle tourism experiences
- Build consumer demand for cycle tourism experiences
- Attract and leverage events.

Parks Victoria: Linking People and Places, 2002

Parks Victoria's Linking People and Places is a strategy and vision for the continued growth and improvement of our open space network. The document provides a strategic context for long-term planning and management of open space within the metropolitan region. The document lists the extension of the Diamond Creek Trail from Nillumbik Park to Hurstbridge as an action to occur in within 10 years from 2002.

Vic Roads: Principal Bicycle Network

The PBN identifies the Diamond Creek Regional Trail extension as a potential off-road path between Diamond Creek and Hurstbridge.

Victorian Health and Wellbeing Plan 2015

The Victorian Health and Wellbeing Plan outlines the government's key priorities over the next four years to improve the health and wellbeing of Victorians. The priorities relevant to the trail extension include;

- *"Encourage and support people to be as physically active as often as possible throughout their lives. Strategies may include active transport (such as walking or cycling to work), neighbourhood design that promotes activity and social connectedness and participation in sport and recreation."*
- *"Land use, land use planning and urban and neighbourhood design can ensure areas are developed to maximise social connectedness and participation, support safe, socially cohesive and inclusive communities, and promote active living. This includes design of pedestrian-friendly neighbourhoods, accessible open spaces for recreation and leisure, and food environments that encourage healthy diets."*

Metropolitan Melbourne Investigations, VEAC 2011

The Metropolitan Melbourne Investigation is an investigation into public land in 29 municipalities in metropolitan Melbourne. The purpose of the investigation was to identify and assess the public land, assess the values of the land and report on appropriate future uses relevant to Melbourne's liveability and natural values, and report on the contribution of the land to Melbourne's liveability and opportunities for enhancement to this contribution.

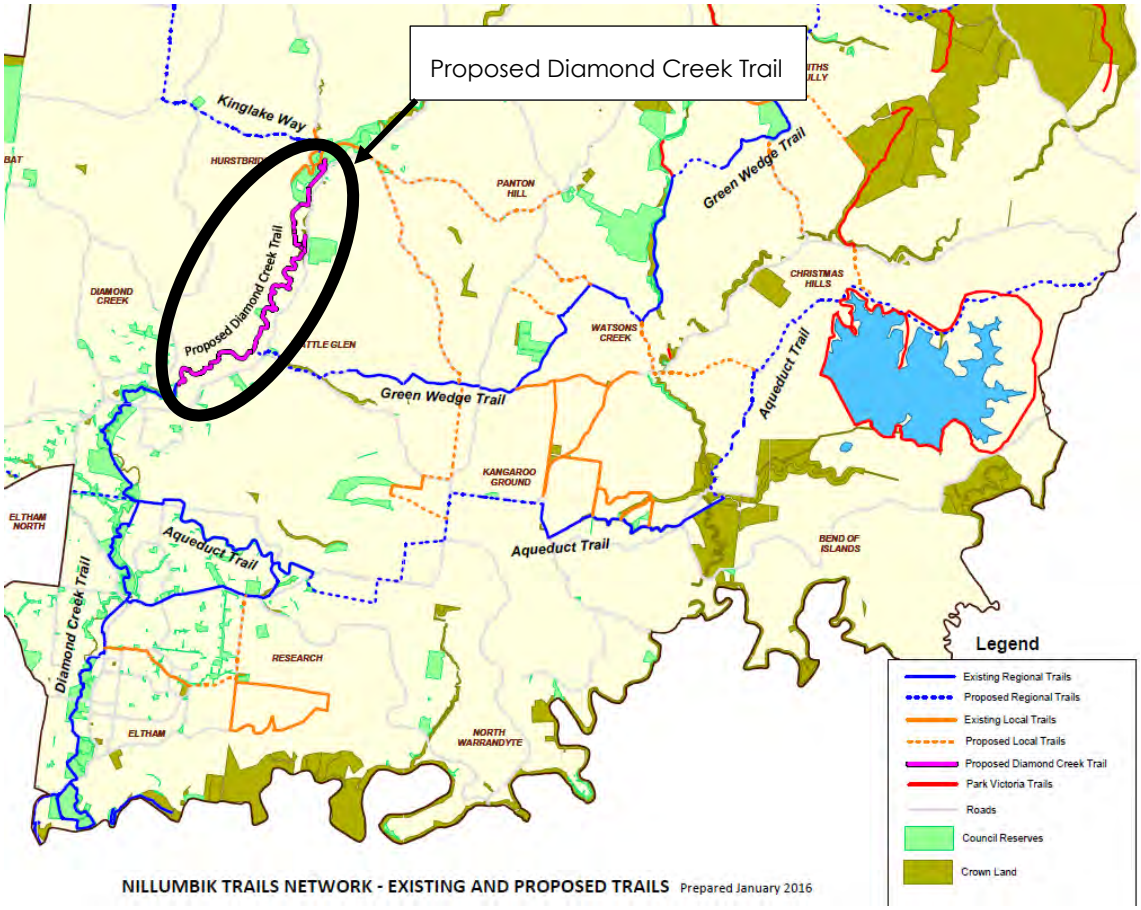
The report outlines that public open space per capita is likely to decrease over time, with the need to protect existing open space and provide new open space to meet the needs of the growing population. The Investigation recommends a Metropolitan Open Space Strategy be developed to respond to the challenges facing Melbourne's open space network.

2.1.2 Regional

Northern Regional Trails Strategy Draft, 2015

The Northern Regional Trails Strategy aims to enhance the existing assets and expand the network across the northern region to realise the true benefits of an integrated regional network. As shown in Figure 2.1 below, the extension would facilitate links with the Green Wedge Trail, Kinglake Way, the Aqueduct Trail and a number of local trails.

Figure 2.1: Proposed Diamond Creek Trail with Existing and Proposed Nillumbik Trails



The report states that the Diamond Creek Trail extension the highest priority for Nillumbik Shire Council, and of regional priority.

It explains that the trail would support tourism as it provides links to important regional parks, conservation areas to the north, and the Diamond Creek and Hurstbridge town centres. It has strong potential tourism value as a major recreational trail. The trail would also provide direct access to railway stations at Diamond Creek, Wattle Glen and Hurstbridge.

The Diamond Creek Trail extension aligns with existing Council plans and a concept design has been undertaken for the project. External funding will be required to undertake the full detailed design and construction of the trail.

The Strategy calculated the economic benefits of each of the trails within the region. It states that the trails represent a tourist attraction, employment opportunity (construction and maintenance) and can improve the liveability of communities.

To quantify these benefits, a cost-benefit analysis was undertaken which considered the capital and operational costs and benefits associated with increased, commuting on recreational trails, recreation opportunities and tourism. The assessment also considered the benefits of constructing the trails in terms of additional job creation, measured as full time equivalent (FTE) employees. The report estimated that the benefit/cost ratio[1] of the Diamond Creek Trail would be in the order of 6.2 (for a 3m wide trail) and 7.5 (for a 4m wide trail) over 30 years.

[1] A benefit/cost ratio is the ratio of the benefits of a project, expressed in monetary terms, relative to its costs, also expressed in monetary terms.

2.1.3 Local

Nillumbik Trails Strategy, 2011

The 2011 Nillumbik Trails Strategy aims to guide the planning and decision making in the provision of recreational trails within the shire. It outlines Council's key priorities for the expansion of the trail network and the proposed actions to achieve these objectives over the next ten years.

The Diamond Creek Trail extension is listed as one of the main recommendations for capital investment and planning in the regional trail network.

The Strategy classifies the Diamond Creek Trail as a regional trail, which satisfies the following priorities:

- Attracts interstate and intrastate visitors
- Generates significant economic benefits to the region
- Excellent quality experiential values
- Significant contribution to the lifestyle, health and social well-being of the broader community
- Trails traverse the Shire and aim to link to other Victorian regional and/or national trails.

The proposed trail extension between Diamond Creek and Hurstbridge is a complex project given the alignment options available (rail, road and creek) and with critical sections of the land along the Diamond Creek in private ownership.

As part of this project, GTA have reviewed the costings identified in the Strategy and updated the costs reflecting more recent detailed investigations and updated construction costs.

Green Wedge Management Plan, 2010

The 2010 Green Wedge Management Plan aims to direct the sustainable management of the Nillumbik Green Wedge in relation to all strategic planning and use of the non-urban areas of the Shire. The plan lists the extension of the Diamond Creek Trail as a People and Communities Action with a high priority in the immediate to short term from 2010 to 2014.

Diamond Creek Major Activity Centre Structure Plan and Leisure Facilities Plan, 2006

The Structure Plan sets out an overall vision for the centre and objectives, strategies and actions focused on themes such as land use, buildings and landscape, community and leisure facilities, and transport and mobility. The plan lists the Diamond Creek Trail as requiring extension from Nillumbik Park to Hurstbridge.

Health and Wellbeing Plan 2013-2017

The Shire of Nillumbik Health and Wellbeing Plan 2013-2017 outlines Council's vision for planning, protecting, and promoting health and wellbeing within the municipality. It communicates the strategic direction that Council will facilitate through partnerships with service providers, government agencies, local organisations, and the Nillumbik community. The Plan identifies the need for the Diamond Creek Trail extension as it will promote the benefits of healthy living and will provide access to a natural environment for people to walk, cycle and ride through.

Nillumbik Recreation Strategy, 2011-2019

The Recreation Strategy 2011-2019 guides the Council in its planning and decision making with respect to the provision of recreational services and facilities. There are eight key themes outlined that underpin the Strategy. With regards to recreation trails, the Strategy recommends that the strategic direction for the recreational trails network be confirmed (the Strategy predates the Trails Strategy update) which is aligned with the following Strategy themes; to increase participation, prioritise unstructured activities, improve equality and increase access.

2.1.4 Trail Significance

The Diamond Creek trail has been recognised as a Regional Trail as it crosses Nillumbik Shire and provides connections to neighbouring municipalities. It is also likely to attract interstate, intrastate and local visitors, and generate economic benefits to the wider region.

As outlined in the previous sections, the Diamond Creek Trail extension has been included in planning strategies for a long period of time and will provide the key (currently missing) link to a number of other trails within the network.

2.2 Benefits of Extending the Diamond Creek Trail

The benefits likely to be realised from the extension of the Diamond Creek Trail are significant, and include the following.

2.2.1 Health and Wellbeing

The health benefits of exercise and active travel are well documented. For individuals, these include improved physical health and mental health resulting from exercise as well as the satisfaction that can come from connecting with other members of the community. Improved health and wellbeing assists in reducing absenteeism (from work, education and other commitments) and lower medical bills.

For employers, fitter and healthier employees means lower rates of sick leave, improved productivity and physiological benefits.

There are also benefits at the community level. An increase in exercise and active travel can lead to a long term reduction in per capita demand on the health system (which would otherwise exist as a result of unfit lifestyle-related illnesses).

The actual benefits likely to accrue from an extension and upgrade of the Diamond Creek trail will be dependent not only on actual trail usage, but also on whether trail users are existing or new trail users. From available data, it is not possible to determine if likely users would be new users attracted to trails for the first time, or existing trail users who may switch from other trails following the upgrade.

It is also noted that increases in active travel and exercise can lead to higher numbers of exercise-related accidents and injuries, which has negative implications for the community wide medical cost burden. However, it can be argued that the costs of physical injuries such as broken legs or arms are likely to be far less than the long term physical and mental health implications of poor health due to a sedentary lifestyles.

2.2.2 Reduction in Accidents

Taking cyclists, horse riders and pedestrians off road has the potential to generate significant benefits via the avoidance of vehicle-related incident costs.

For example, Austroads endorsed data indicates that the cost of a fatal or serious injury crash at a suburban intersection is in the range of $470,000 - $560,000.

Data is not available at this time to estimate the likely reduction in vehicle-related accidents from the extension of the Diamond Creek Trail, however, the above per-incident average cost clearly shows that even one such conflict results in significant costs, even before the wider impacts (e.g., negative community reactions, impacts on insurance premiums) are factored in.

Therefore, the benefits of avoiding vehicle-related incidents by creating a separate trail for non-vehicle movements are significant.

2.2.3 Travel Time and Cost Savings

It is possible to place a value on time savings that can arise from a change in transport mode or route. This is particularly relevant in the case of commuting, where the benefits of a faster trip to/from work can be quantified in terms of the dollar value of time saved, and the reduction in vehicle operating costs.

Although it has been assumed for the purpose of this analysis that the majority of trail use is for exercise and leisure, there are still potential commute-related benefits that may accrue from the trail extension, as residents employed by local businesses may use the trail extension to travel to and from work.

The trail extension may also encourage more children to travel to school on foot, bikes or scooters. In addition to the health benefits for children, this would reduce the number of cars involved in dropping children at school, which reduces both congestion (community benefit) and vehicle operating costs (personal benefit).

At this stage, actual quantification of these travel time and vehicle cost savings is not possible as estimated travel time reductions are not available.

2.2.4 Tourism

Although approximately 75% of trail users on urban regional trails are assumed to be local residents, there is still potential for significant tourism benefits from the proposed trail extensions/developments.

As shown in Figure 2.1 the trail extension will form a key part of the wider trails network, creating linkages to the Green Wedge Trails and Kinglake Way and a number of smaller local trails.

The attractiveness for trail users, including tourists, comes via the access that the extended trail will provide to regional parks and conservation areas, leisure centres and recreational and community facilities. It will also give trail users direct access to the Diamond Creek and Hurstbridge townships, furthering its potential tourism value. This is likely to be appealing to the large potential catchment population, with visitors attracted to the area by the opportunity to traverse the integrated trail system, and/or use them to access services, facilities and venues along the trails.

It is noted that benefits already arise from the existing trails in the area. However, the Diamond Creek trail extension is the 'missing link' that is needed in order to fully unlock the potential of the integrated network to provide an off-road trail between Melbourne (Yarra Trail) and Hurstbridge. It will provide links into other trails, and end to end (or loop) exercise and leisure path, access to tourist attractions and facilities, and interfaces with public transport.

Actions to encourage greater tourist numbers to the area are a core part of Council's economic development strategy. Further, trail users, being engaged in passive recreation, represent the preferred 'low impact tourism' target group.

The Nillumbik Destination Management Plan (2015) also identifies the further development of the formal shared trail network (including Diamond Creek trail) as a key strategy in order to attract greater visitor numbers as well as extract greater yield from existing visitors. The report identifies the trails as being a key part of the nature based tourism that the Council wishes to further develop.

In terms of tourism spend, the Nillumbik Trails Strategy (2011) estimated that the extension of the Diamond Creek Trail could generate direct revenue in the order of $420,000 per annum. This includes trail users purchasing food and drinks at local cafes and shops as part of the recreation experience.

In linking into rural regional trails such as the Green Wedge Trail, the Diamond Creek Trail extension is likely to attract patronage from the wider rural trails network. As rural trails tend to attract a much higher percentage of visitors (75% visitors vs. 25% local), and trail visitors spend more per capita than do locals, this represents additional potential tourist numbers and spend for the area.

2.2.5 Environment

Improved access to the creek would give Council security of tenure over the land and facilitate the implementation of actions required to:

- Improve water quality.
- Stabilise the creek bank.
- Restore and enhance animal habitats.

The trail extension would therefore assist Council in maintaining the integrity of the Nillumbik Green Wedge.

Further, use of trails rather than vehicles (whether for commute or non-commute purposes) reduces vehicle emissions and therefore assists the environment.

2.2.6 Cultural and Heritage Benefits

The trail would provide opportunities for the community to experience the cultural heritage of the area, including aspects of pre-contact heritage, such as scarred trees, and post-contact heritage, such as features related to previous use of the area for gold-mining and agriculture. Interpretive displays could be erected to alert and inform trail users of these cultural heritage features.

2.2.7 Other Wider Economic Benefits

In addition to the 'direct' benefits that can be realised from trails, there are also economic benefits that can accrue to the broader economy. These include:

- Additional visitors to the region, attracted by the availability of the trail and the linkages between this and other surrounding trails.
- Increased patronage to businesses along and at the end of the trail e.g., cafes, pubs, shops.
- Increased patronage of other recreation and community facilities along or near the trail (leisure centres, sporting facilities, community centres)
- Increased demand for Active Travel-related businesses e.g., bike shops, equipment hire.
- Positive impacts on property values due to the availability of, and proximity to, recreational facilities. This is particularly likely if the trail forms part of an integrated network.
- Employment opportunities, both during and after construction.

In support of this, it is noted that the Northern Regional Trails Strategy (2015) estimated that the Benefit/Cost ratio of the Diamond Creek Trail would 6.2 (for a 3m wide trail) and 7.5 (for a 4m wide trail) 30 years.

2.3 Potential Demand for Diamond Creek Trail

2.3.1 Previously Estimated Visitor Patterns

The Nillumbik Trails Strategy 2011 estimated visitor patterns based on comparative figures from the Warburton Trail in the Shire of Yarra Ranges.

Both the Warburton Trail and the Diamond Creek Trail, which connects local townships and traverses local residential areas including Eltham and Diamond Creek, were seen as similar in regard to their classifications as urban regional trails, and this provided a reasonable justification to base predictions of future use on existing Warburton Trail data.

Based on studies including the Barwon South West Regional Trails Master Plan, 2009 (Robin Crocker and Associates) and Cycling in Regional Communities, 2009 (Associate Professor Sue Beeton, PhD), the Diamond Creek Trail forecasts adopted a usage ratio of 75% local to 25% visitor use for its analysis. These estimates are identified in Table 2.1 below.

Table 2.1: 2011 Expected Annual Use of Diamond Creek Trail

Annual Use Overall		Local Use		Visitor Use	
Expected	105,000	78,750	75%	26,250	25%

Since that initial work and estimates of use, Council has participated in Bicycle Victoria's Super Sunday and Super Tuesday visual bike and user counts. These projects collect data once a year on the visitations and types of use at a number of sections of the Diamond Creek Trail (and other trails in the Council and across Australia). The Super Sunday data is collected for all recreational trail users on one Sunday per year in early November for four hours from 11:00AM to 3:00PM – stated as a peak annual user period. Data for Super Tuesday is collected for commuter cyclists on one Tuesday per year in March for a period of two hours from 7:00AM to 9:00AM.

The Council commenced the Super Tuesday program in 2010 and Super Sunday in 2011 with statistics being recorded at key locations along the recreation trail network. Based on information in the Super Sunday reports provided by Council, which provide the broader user count data for each main user group, a summary of the different users has been compiled.

The information in Table 2.2 below identifies a significant increase in trail use from each of the groups and will be used in part, to estimate future trail use.

Table 2.2: Super Sunday User Count Data

User Type	2011	2014	Change	
			Count	%
Walkers	259	831	572	220
Bicycles	293	916	623	212
Dogs	67	117	50	75
Runner	63	1091	1,028	1,631
Other	12	67	55	458
TOTAL	**694**	**3,022**	**2,328**	**435**

In support of these results, the Super Tuesday reports indicate that the Diamond Creek Trail is identified as one of the key commuter and link routes for riders in Nillumbik and that overall there is steady and consistent growth in trail use.

This included a 16% increase in annual growth across all Nillumbik Shire Council trails for 2015 compared to the same locations counted in 2014. This information will also be used to estimate future trail usage.

2.3.2 Demographics

In 2011, based on information published in the Nillumbik Trails Strategy, Council's population and age profile review indicated the following:

- 47.5% aged 0 to 34 years
- 52.5% aged 35 years and older
- More than 54% of households have access to weekly incomes greater than $1000
- Approximately 9 out of 10 Nillumbik residents have access to a private vehicle.

Table 2.3 identifies the population and age statistics identified in the Nillumbik Trails Strategy 2012 and compares them to predictions forecast to 2036 as supplied by the Australian Bureau of Statistics Community Profile.

Table 2.3: Population and Age Comparisons

Year	Population		Age %			
	Actual/Projected	Change %	< 34		>35	
			Actual/Projected	%	Actual/Projected	%
2011	62,716		29,790	47.5	32,926	52.5
2036	67,304	7.29	27864	41.4	39,440	58.6

Council's population is forecast to grow by about 4,600 over the 25 year period from 2011 to 2036 – an annual average growth rate of 0.18%. Much of this growth, around 1650 people, will occur between 2032 and 2036.

Households are forecast to increase by nearly 3,400, however during the same time the average household size will decrease from 3.03 to 2.79. Of interest is that dwellings in the Diamond Creek area are forecast to increase by 1,100 over that period and its population will grow from 11,600 to 14,000 – an increase of 2,400 or around 50% of Council's overall growth.

Births across the council area are expected to remain relatively stable at around 600 per year while deaths will increase from 235 to 430 by 2036. Migration is expected to increase slightly over the 25 year forecast period.

In 2011, the dominant age group was 50 to 54, which accounted for 8.8% of the total population. The largest increase between 2011 and 2036 is forecast to be in the 70 to 74 age group, while the largest 5 year age group in 2036 will be 45 to 49.

Overall the population and demographic forecasts for the Council are relatively stable. Notable is the small increase in population in the Diamond Creek area which may further increase demands for use and extension to the Diamond Creek Trail.

2.3.3 Trends and Participation Rates

Recreation and sport are important to lifestyle and play a large part in the lives of many Australians. Participation offers many benefits ranging from simple enjoyment to improved health and the opportunity for social interaction. Identifying recreation trends supports planning for the future and helps planners prepare new policy directions, and frameworks and strategies for the management, design and use of recreation facilities.

Recreation Trail Trends

Trends relating to population growth, changes in makeup of the population, awareness of personal health, environmental concerns, technological developments and changing levels of wealth all impact on individual lifestyle and recreation preferences. A range of trends relating to

recreation is included in Appendix A with reference to some specific trends impacting on trails identified below.

- Urban and regional walking trails are now used by recreational walkers for pleasure and fitness as well as traditional bushwalkers
- Walks of up to 6 kilometres that take between 30 minutes and 2 hours are most preferred
- Walks of around 4 hours and full day walks are preferred by less walkers than shorter walks
- Cycling in general is a rapidly growing across Australia
- Mountain biking is preferred in non-urban areas and settings
- Cycle tourism is increasing and attracts international visitors as well as local residents
- More families and older age groups tend to participate in cycle tourism than single people and couples
- Horse riders generally prefer loop trails
- Trail rides of around 3 – 4 hours are preferred by horse riders.

Participation Rates

The Australian Sports Commission's Exercise, Recreation and Sport Survey (ERASS) provides information regarding participation in physical activity across Australia. While noting that it was discontinued in 2010, it is still a very relevant source of information. National physical activity trends indicate participation in unstructured recreation activities is increasing and relative to those trends, the desire to use recreational trails is growing.

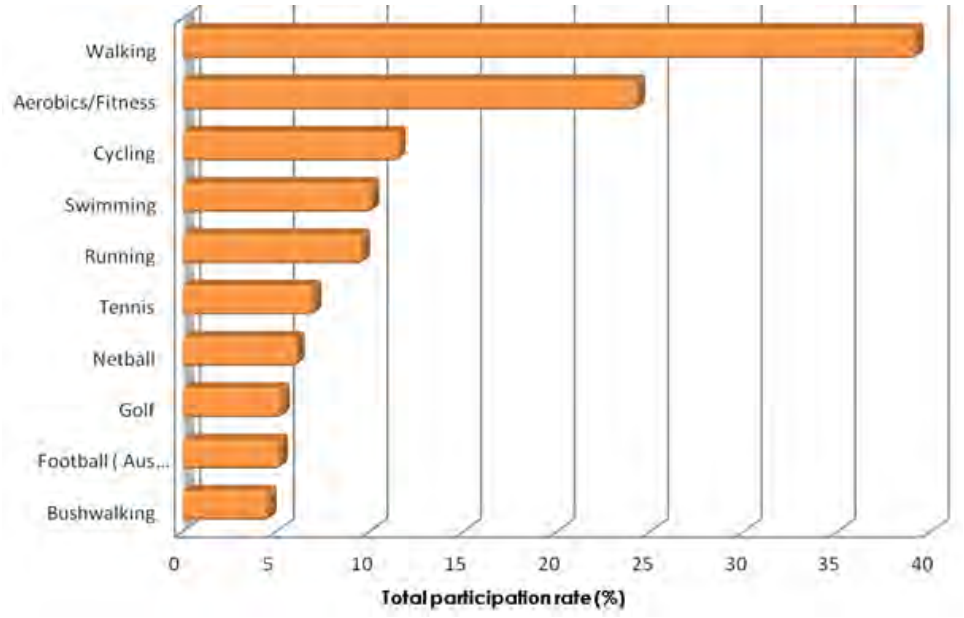
The 2010 Exercise, Recreation and Sport Survey (ERASS) identified that nationally:

- The 2010 regular participation rate in physical activity increased from 2001 and the overall trend appears to be a slowly increasing regular participation rate.
- In terms of the top ten physical activities participation in cycling and walking increased in the ten-year period, although walking, running and cycling showed some fluctuation. Total participation in walking increased between 2001 and 2004, decreased somewhat between 2004 and 2007, increased in 2008, and then decreased again slightly in 2009.
- In terms of total participation rates, walking, bushwalking and cycling featured in the top ten physical activities in 2010. An estimated 6.3 million persons, or 35.9% of the population, participated at least once in walking for exercise, recreation or sport.
- In terms of total participation, walking, bushwalking and cycling were in the top ten non-organised physical activities. Most walking and cycling activities were non-organised.

In relation to Victoria:

- Walking is the most popular recreational activity (as it is nationally) – more than 1.8 million walkers participate in Victoria (including bushwalkers).
- Bushwalking is the eighth most popular Victorian activity with just over 200,000 participants – it is in the top ten national activities.
- Cycling is the fifth most popular activity in Victoria (third nationally) - more than 555,000 cyclists participate.
- Horse riding has almost 36,000 participants in Victoria - around 0.8% of the population. It is ranked equally with canoeing/ kayaking, squash/racquetball and table tennis as the 24th most popular activity.

Figure 2.2: ERASS 2010 National Top Ten Physical Activities



Further to the 2010 ERASS data, the Australian Bureau of Statistics has provided a recent update (2015) on Participation in Sport and Physical Recreation in Australia as at 2013-14. These statistics show that:

- Of the Australian population aged 15 years and over, an estimated 60% (11.1 million people) had participated in sport and physical recreation at least once during the in 2013–14, compared with 65% in 2011-12.
- Participation decreased with age. People aged 15–17 years reported the highest participation rate (74%), while people aged 65 years and over had the lowest (47%).
- Male and female participation rates were similar, except in the 25-34 age group where participation rates were higher for males (67%) than females (61%).
- Walking for exercise was the most popular activity, with 19% of people aged 15 years and over walking for exercise at least once in the 12 months prior to interview. Females were more likely to walk for exercise than males (25% and 14% respectively).
- Fitness and gym were the next most popular activity (17%) again with more females than males participating (19% and 16% respectively).
- Males were more likely than females to play golf (6.6% and 1.4% respectively) or participate in cycling and BMXing (8.5% and 4.0% respectively).

In 2013 -14, around 5.2 million people aged 15 years and over (28%) reported that they were involved in organised sport and physical activity in some form. This included 4.7 million people involved in playing roles (26% of persons aged 15 years and over), and 1.4 million people involved in non-playing roles (7.7%). This involvement generally decreased with age.

These ABS data are in keeping with trails related findings noted by Transplan and Mike Halliburton Associates 2009 in the Murrumbidgee Valley Rail Trail Feasibility Study[2]. Those studies identified that walking was the most popular trail activity followed by cycling and horse riding. Research conducted by Market Equity in 2004 stated in the Sustainable Recreation Trails (2007)[3], found that

[2] Transplan Pty Ltd & Mike Halliburton Associates, 2009, Murrumbidgee Valley Rail Trail Feasibility Study

[3] State Government of South Australia, 2007, Sustainable Recreational Trails; Guidelines for the Planning, Design, Construction and Maintenance of Recreational Trails in South Australia

trails provide strong incentive to exercise (up to 85% of users) and were used by many as a means to spend time with family and friends (up to 89%).

The trends and participation rates stated in this section demonstrate that demand and participation rates for walking and riding are increasing. This suggests that trail users will look for more opportunities, additional infrastructure and different trail experiences in the future.

Based on these trends and participation rates, the extension of the Diamond Creek Trail appears to be well supported.

2.3.4 Trail Use and User Profiles

Having a general knowledge of who will use a trail is necessary to appropriately plan, design and provide this infrastructure. As well as identifying trail users for design reasons, understanding who uses a trail can also help alleviate the local community's concerns around inappropriate behaviour such as trespassing, theft and privacy.

Trail Users

Transplan and Mike Halliburton Associates found that while there has been minimal investigation into trail user profiles, the research that has been conducted indicates that:

- Almost half of the users of the Murray to the Mountains Rail Trail listed their employment status as professional (e.g. doctors, lawyers, managers).
- 53% of people who participate in outdoor recreation are aged between 25 and 54[4].
- 80% of users of the Bibbulmun Track (Western Australia's primary long-distance walk track) are aged between 25 and 60[5].
- 62% of users of the Murray to the Mountains Rail Trail were aged between 31 and 60, while 28% were aged between 9 and 20.
- The City of Greater Geelong conducted a survey of walkers which identified that 82.9% of respondents who had a degree or post-graduate qualifications had walked for exercise or pleasure in the last weeks, while only 62.9% of those who had left school in Year 10 or earlier had walked for exercise or pleasure in the last 2 weeks.
- People using a series of walk and cycle trails in SA are motivated by a desire to attain a sense of well-being (95%), to unwind and relax (91%), to be close to nature (87%), and to be close to family and friends (70%)[6].

In addition to understanding the profile of trail users, having an awareness of their preferences for distances and time spent walking and riding is important. Transplan and Mike Halliburton and Associates 2009[7] work noted that a study undertaken during the preparation of the Victorian Trails Strategy 2005 -2010 identified that walks of up to 6 kilometres and those that take between 30 minutes and 2 hours are preferred. Studies conducted by Market Equity in South Australia support this noting that 76% of walkers used trails for less than two hours.

That study also noted a difference between walking and cycling behaviour with research conducted by Market Equity indicating most cyclists use a trail for 3-4 hours and are more prepared to travel to use a trail than walkers.

Trail Preferences

Based on the user profile information and other studies and research, it is clear that a broad range of people from different backgrounds, education levels and ages use trails for reasons

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4 Queensland Government, SEQ Water and Griffith University, 2007, South East Queensland Outdoor Recreation Demand Study

5 Colmar Brunton, 2004, Bibbulmun Track User Short Research Project Report to the Department of Conservation and Land Management and the Bibbulmun Track Foundation

6 Riverina Regional Development Board and Gundagai Shire Council (2009) Murrumbidgee Valley Rail Trail Feasibility Study

including health, fitness, socialising, getting close to nature and commuting. It is also important that they feel safe. People choose to use a trail because of the experiences offered and the purpose of the activity. Experiences in natural settings are generally preferred by recreational users but this depends largely on the intended use.

Trails are also regarded as key infrastructure elements that connect towns and other destination points. Creating and maintaining these connections and providing links to other trail networks is very attractive to users and supports increased activity and the social, environmental and economic benefits associated with trails.

The results of the survey conducted by council in Aug/Sept 2015 regarding the proposed Diamond Creek Trail extension attracted 1371 responses and align with the trail study findings noted above. The results identified that respondents use that trail for walking (76.5%), cycling (65.8%), exercise (52%), running (38%) and horse riding (9%). The trail is used for connecting people to townships by 20% of respondents and for commuting by 12%.

People wanted to experience family enjoyment (53%), wellbeing (42%) and connecting with the environment (41%). Feelings of safety, scenery and views, and peace and quiet were also strong preferences.

In reference to the route alternatives, 89% of respondents preferred the alignment "close to the creek" with 11% choosing "close to the road". While the survey did not seek specific reasons for people's preferred alignment, it could be reasonable to expect that of the 11% with a preference for the "close to the road" route, many respondents may be commuter cyclists.

This view is formed given that a number of studies conducted into cycle behaviour have identified that while all cyclists are concerned with variables including distance, safety, grade and scenery, commuting cyclists in particular can often be under some pressure to arrive at their destination within a certain timeframe – for example work. As a result, they prefer more direct routes, separate bicycle paths where possible, and the ability to travel more quickly in the presence of low traffic volumes – vehicular and pedestrian.

2.3.5 Future Trail Patronage

Given the information and data discussed in the previous sections, there is sufficient evidence to conclude that trails in general will continue to be in demand and that use of the Diamond Creek Trail will increase. To support this conclusion, trail count data collected from the Bicycle Network's Super Sunday and Super Tuesday projects has been utilised to estimate annual use.

These estimates are based on data provided in the Super Sunday and Super Tuesday reports for nearby trials in the years 2011 and 2014.

It should be noted that these trail use numbers are high level estimates only in the absence of sufficient actual data on the Diamond Creek Trail and they are not statistically valid. To accurately assess the patronage of the trail with reasonable confidence, a statistically valid trail count would be required. The high level estimates are provided for the purpose of assisting the economic analysis of the trail extension and are subject to the variations of a number of assumptions (provided below).

The estimates are limited by not having direct comparisons between Super Tuesday and Super Sunday data and also by the lack of base data for overall trail use counts. Super Sunday data for all collection sites along the Diamond Trail has been used and this may result in individual users being counted on multiple times depending on the length of their journey.

The following assumptions have been used to estimate the annual trail use for the proposed extension:

- Sundays are the peak usage day across the year.
- Saturdays experience less use than Sundays due to competition with other leisure, social and sporting opportunities.
- Each of the weekdays is assumed to experience approximately the same usage rates.
- The Super Sunday data is collected during spring, in early November and is presumed as the busiest season based on Bicycle Network data. Autumn is considered on par with spring for use. Summer and winter are considered less busy seasons.
- Calculating Saturday and Sunday rates is based on:
    - Saturday use is based on 50% of the peak Sunday time
    - 9:00AM to 1:00PM being the peak use time (100%)
    - 1:00PM to 6:00PM being average use times (50% of peak time)
    - 7:00AM to 9:00AM and 6:00PM to 8:00PM being low use times (10% of peak time)
    - Seasonal adjustments for use have been assumed as;
        - Spring and autumn (100%)
        - Summer and winter (75%).
- Weekday peak high use time is calculated on Super Tuesday bicycle data at site 4524 as a percentage of Super Sunday bicycle data at the same location (noted as site 4). This is the only site that data is collected and described in both reports. It is noted that data is collected for a 2 hour period on Super Tuesday and is focused on commuter riders.
- To provide a consistent timeframe of four hours - noting that the key commuting time is 7:00AM to 9:00AM, the total counts have been multiplied by a factor of 1.5 and rounded up to arrive at an estimated count.
- The percentage ratio for both years is in the 8% range - 7.95% for 2011 and 8.4% for 2014 (refer to Table 2.4 below).

Table 2.4: Bicycle Use Percentage Ratios

Year	Super Tuesday		Super Sunday	% Ratio
	Actual	Adjusted		
2011	9	14	176	7.95
2014	13	20	238	8.40

- The increase in use in 2014 reflects increased use reported from all survey formats. Given the consistency across these years, the percentage ratio will be rounded up to 10% and applied to Super Sunday counts across all trail users to estimate weekday use.
- Calculating weekday use is based on:
    - 7:00AM to 9:00AM and 6:00PM to 8:00PM being high use times (10% of Sunday peak – refer to Table 4)
    - 9:00AM to 6:00PM being low use times (10% of weekday peak time)
    - seasonal adjustments are consistent with Saturday and Sunday assumptions.

Based on these assumptions and utilising the 2014 Super Sunday data counts listed in Table 2.2, the following Annual Usage data has been formulated for the whole of trail use.

Table 2.5: Estimated Annual Use for 2015

Walkers	Bicycles	Dog Walkers	Runner	Other	TOTAL
98,577	108,661	13,879	129,420	7,948	**358,485**

2.4 Trail Justification Summary

The data and analysis presented above indicate that:

- There is clear demand for the extension of the Diamond Creek Trail to Hurstbridge.
- The trail extension is consistent with state, regional and local strategies. Further, its importance is highlighted by the fact that it is singled out as a key priority in a number of strategy documents.
- The extension will provide the key (currently missing) link to a number of other trails within the network.
- There are clear social and economic benefits to be realised via the trail extension including health and wellbeing benefits, a reduction in accidents, travel time & cost savings, tourism benefits, environmental benefits and wider economic benefits to the region.
- There is sufficient demand to justify the trail extension with potential trail patronage demand of 358,485 users per annum.

3. Road/Creek vs Creek Alignment: Design and Cost Review

3.1 Proposed Alignments

The Council has provided concept designs and cost estimates for two main alignment options, a road/creek alignment and a creek only alignment.

Road/Creek Alignment

The road side trail travels from Diamond Creek to Wattle Glen adjacent to Main Hurstbridge Road. The trail follows the road alignment and provides a two directional shared use trail on one side of the road (alternate sides of the road depending on land availability) generally following an existing sealed path crossing several side roads. At Wattle Glen, the trail travels away from Main Hurstbridge Road towards the creek and follows the preferred creek alignment to Hurstbridge. The road reserve and topography is inadequate to accommodate a recreational road side trail alignment between Wattle Glen and Hurstbridge.

Creek Side Alignment

The creek side alignment has been prepared considering various alignment options on either side of the creek. A preferred alignment is proposed based on the topography of the land and seeks to minimise property acquisition, minimise creek crossings and avoid Vic Track land.

The preferred trail alignment travels mainly on the west side of the creek with five creek crossings. Importantly this alignment avoids any VicTrack land as much as possible due to topography constraints, the required restrictions to some users (i.e horse riders), the need to upgrade the existing crossing, VicTrack approval risks and the potential for the trail to have to close during VicTrack maintenance works. Four of the creek crossings propose normal shared use crossings while the northernmost bridge near Hurstbridge is proposed to provide access to fire appliances at the request of the CFA.

3.2 Design Considerations

The general principles followed by Council in the design of the preferred creek side trail option are as follows:

- Use of Council or Crown Land where possible, in order to reduce the requirement to acquire privately owned land.
- To keep the number of private properties effected by land acquisition to a minimum.
- To avoid close proximity to existing dwellings and associated buildings on privately owned land.
- To achieve appropriate design standards, i.e. gradient, width, run off.
- To keep an appropriate distance from the creek bed and banks to minimise environmental disturbance.
- To minimise vegetation removal and retain buffers
- Additional facilities were not included in this cost estimate as per below assumptions.
    - Lighting – This is depend on council requirement and other proposed facilities (parks, car parks, shelters and other amenities)
    - Parking facilities
    - Picnic and Play areas

- Shelters
- End of trip facilities

- The alignment through VicTrack land is not the preferred option due to topography constraints, the required restrictions to some users (i.e horse riders), the need to upgrade the existing crossing, VicTrack approval risks and the potential for the trail to have to close during VicTrack maintenance works.
- Concrete and asphalt trail for 3.3 km were compared in the road side option from Diamond Creek to Wattle Glen.

3.3 Site Visit

A site visit was undertaken on Tuesday 10 November. During the site visit, the road side and creek side alignments were reviewed to identify site constraints and opportunities to inform the cost review and risk assessment.

3.4 Construction Cost

3.4.1 Road/Creek Alignment

As previously noted, the road/creek option includes the upgrade of an existing path/trail that follows Main Hurstbridge Road between Diamond Creek and Wattle Glen. The Council has provided cost estimate options for both a concrete path and an asphalt path. GTA has undertaken a review and updated the Council costs which found a slight increase in both the concrete and asphalt estimates. The updated estimates are shown in Table 3.1.

Table 3.1: Road/Creek Option – Cost Estimate

Alignment	Material	Trail estimate (incl. contingency, design & supervision)
Diamond Creek to Wattle Glen (road side)	Concrete	$3,183,533
	Asphalt	$2,543,528
Wattle Glen to Hurstbridge (creek side)	Concrete	$4,196,735
TOTAL – Diamond Creek to Hurstbridge	Concrete	$7,380,286
	Asphalt/Concrete	$6,740,263

A detailed breakdown of the costs is provided in Appendix A.

3.4.2 Creek Alignment

GTA has reviewed the cost estimates provided by Council with the GTA estimate shown in Table 3.2. It is noted that these costs exclude the land acquisition costs as outlined in Section 3.5.

Table 3.2: Creek Side Options – Cost Estimate

Option	Trail estimate (incl. contingency, design & supervision)
Diamond Creek to Wattle Glen	$2,761,907
Wattle Glen to Hurstbridge	$4,196,735
Preferred Alignment	$6,958,642

3.5 Land Acquisition Costs

Nillumbik Shire Council engaged Matheson Stephens Valuations (MSV) to provide expected land acquisition costs for the creek sections of the alignment. MSV provided low, medium and high compensation rates resulting in a 'Most Likely' cost for the preferred option.

The Most Likely land acquisition costs for the two sections are shown in Table 3.4.

Table 3.3: Most Likely Land Acquisition Costs

Section	Most Likely Land Acquisition Cost
Diamond Creek to Wattle Glen (Creek option only)	$2,544,400
Wattle Glen to Hurstbridge (Creek and Road/Creek option)	$1,388,500

3.6 Cost Summary

Incorporating the expected land acquisition cost associated with the creek side preferred option, the total cost of both the creek side and road side option (incorporating design & survey, supervision and a 30% contingency) is shown in Table 3.4.

Table 3.4: Expected Total Cost of Creek and Road Side Options (Diamond Creek to Hurstbridge)

Option	Construction Cost	Land Acquisition	Expected Total Cost
Road/Creek Alignment (Concrete)	$7,380,286	$1,388,500	**$8,768,768**
Creek Alignment (Preferred Alignment)	$6,958,642	$3,932,900	**$10,891,542**

3.6.1 Creek Side Option

The creek side option has a preferred alignment as shown in Appendix B. The concept design process considered alternative options and the preferred option was selected as outlined in the justification below provided by Council;

Option Specific Justification Luscombe Drive, Diamond Creek - Wilson Road, Wattle Glen

- *The trail extension commences on the north west side of the Diamond Creek at Luscombe Street Diamond Creek, where it joins an the existing trail.*
- *From Luscombe Street, the preferred option is located on the north west side of the Diamond Creek through future Council owned open space at 142 Broad Gully Road, then through privately owned land at 22 Herberts Lane.*
- *To avoid a steep escarpment located on 22 Herberts Lane, the preferred option crosses to south eastern side of the creek and passes through 201 and 203 Main Hurstbridge Road.*
- *Due to two narrow pinch points (between the Diamond Creek, railway and the Main Hurstbridge Road) and the number and close proximity of existing dwellings on the south- eastern side of the creek, the preferred option crosses to the north west side of the creek from 203 Main Hurstbridge Road onto private creek side land located at 26 Herberts Lane and 86 Wilson Road, where it emerges at Wilson Road, Wattle Glen.*
- *Option 1 in this section - to cut across the creek from Luscombe Drive directly onto 185 Main Hurstbridge Road has been rejected as it would entail additional land acquisition, which would most likely result in the loss of access to the Diamond Creek for the owners of that property.*

Option Specific Justification Wilson Road, Wattle Glen – Wadeson Road, Hurstbridge

- *Following the principle of utilising Council or Crown land as much as possible, from Wilson Road, the preferred route passes through Council owned land located on the western side of the Diamond Creek at 137 Wilson Road and passes onto an existing creek side Council owned reserve adjacent to 65 -135 Wilson Road. Due to the Council owned reserve providing insufficient width for the required footprint of the trail, an additional 15m adjacent to the eastern boundary of privately owned land to the west of the trail alignment (affecting 65-135 Wilson Road) will need to be acquired to achieve the desired trail footprint.*
- *The preferred trail option crosses the creek from the Council reserve adjacent 65-135 Wilson Road, onto the eastern side the creek to avoid steep creek banks on the western side, and to take advantage of existing Crown Land and a Council reserve at 666 Heidelberg Kinglake Road. Due to the creek proximity to the railway line, the most feasible option is to cross and recross the creek into 673 and 687 Heidelberg-Kinglake Road. The detail of this alignment can be developed further.*
- *An option to utilise a 300 metre length section of Vic Track land on the eastern side of the creek was considered in this section, which would have reduced the requirement to acquire private land. The Council initiated investigation and subsequent report Shared Use Path within the Rail Reserve - Hurstbridge (Cardno 2015) concluded that the difficulties in gaining agreement from Vic Track and technical issues relating to a crossing upgrade requirement would prove difficult to overcome.*

Option Specific Justification Wadeson Road, Hurstbridge - Hurstbridge

From Wadeson Road, the preferred option is located on a future Council reserve located on the western side of the Diamond Creek. There are no options to the creek side trail in this section and no private land acquisition is anticipated.

4. Road/Creek vs Creek Alignment: Benefits Review

4.1 Approach / Methodology

As discussed in Section 2.2, there are likely to be significant benefits at both the personal and community level from an extension to the Diamond Creek Trail.

The realisation of these benefits will be influenced by the choice of alignment. Therefore, an analysis of the benefits of each alignment has been conducted, to assess which option is more likely to result in the realisation of the potential benefits. The creek option is the only option considered between Wattle Glen and Hurstbridge due to the limited road reserve excluding a road side option. Therefore this analysis compares the road and creek options between Diamond Creek and Wattle Glen.

The analysis also involved identifying dependencies; that is, preconditions to the realisation of the benefits.

The analysis process was as follows:

- identification of potential benefits that can be realised from provision or extension of a trail
- development of a summary of key features of the two trail alignments
- based on the above two points, assessment of whether or not each benefit is likely to be realised with a creek or road aligned trail

4.2 Key Points and Assumptions

Following review of available Council materials and relevant trails-related studies, the following assumptions were adopted for the purpose of the benefits analysis.

- The vast majority of trail use is for non-commute purposes; therefore, factors such as speed of travel from end to end and the directness of route are unlikely to be of key importance for many users.
- A significant proportion of users (and projected users) use trails for exercise and/or to spend time with family and friends.

Naturally, the features likely to appeal to commuter and non-commuter user groups will differ.

4.3 Characteristics of Trail Users

Trends in characteristics of trail users (per demand review):

Walkers

- Walking is the most popular trail activity
- Increasing demand for urban trails from recreational walkers, not just traditional bushwalkers
- There is a preference from walkers for walks of up to 6 kilometres (of 30 – 120 min duration)

Cyclists

- Increasing demand for cycling trails

- Cycle tourism is increasing and attracts visitors from outside the local area as well as local residents
- More families and older age groups tend to participate in cycle tourism than single people and couples

Horse Riders

- Horse riders generally prefer loop trails
- Trail rides of around 3 – 4 hours are preferred by horse riders

Usage purpose

- Exercise
- Spending time with family and friends
- Relaxation
- Seeking new and different trail experiences

4.4 Factors Influencing Trail Usage

Based on the above identified usage purpose, it can be assumed that key factors influencing demand for, and use of, trail, are likely to be as follows:

Table 4.1: Key Factors Influencing Demand

Category	Influences and Requirements
Degree of difficulty / challenge	○ Gradient ○ Surface(s)
Aesthetics	○ Shade ○ Foliage ○ Natural attractions ○ Scenery ○ Peace and quiet ○ 'Open space'
Amenities	○ Toilets ○ Drinking fountains ○ Rest stops ○ Bike racks
Connectivity	○ Ease of access from trail to car parking, PT ○ Car parking availability and safety ○ Ability to enter/leave trail along the route ○ Links to public transport (exercise along trail and catch train back)
Accessibility	○ Support for people with mobility impairments e.g., hand rails
Socialisation	○ Opportunities to socialise with family and friends
Affiliated exercise opportunities	○ Cross training equipment along trail ○ Opportunities to create different exercise courses (length, direction)
Safety	○ Accidents ○ Assaults ○ Perceived danger from isolation ○ Ease of access for emergency vehicles

These factors have been considered (where relevant) in the benefits analysis.

4.5 Quantification of Benefits

It is desirable to quantify the benefits likely to arise out of the proposed trail extension. However, quantification requires both:

- forecasted trail use

- identification of the proportion of trail users who would be diverted from other trails (i.e. existing trail users), as opposed to new trail users.

Based on available data, it was not possible to determine if forecasted users represent active users of other trails (who may be encouraged to divert to the Diamond Creek extension) or individuals who had not previously used trails.

Therefore, although unit benefits have been documented where applicable and available, the benefits analysis has been largely limited to a qualitative assessment only.

4.6 Notes on Specific Benefits

The benefits expected to arise from the trail extension are shown in Table 4.2. Supporting commentary on specific benefits is documented below.

4.6.1 Horses

The road aligned section of the road/creek trail option will not cater for horse riders via a separated, natural surface track (as the creek aligned option will). This leaves open the possibility that horse riders will be either forced to the road, or use the road aligned trail despite it not being suitable for their needs (width, surface).

Even though horses will be technically 'off road' if using the road aligned trail, they may be spooked by the speed of passing traffic, or they may feel boxed in by fencing along the trail. Both factors can cause horses to behave unpredictably, resulting in safety issues for both trail and road users.

4.6.2 Personal Safety Issues

In addition to the danger of collisions with vehicles and other trail users, safety on trails also encompasses the risk of personal assaults. Of relevance here are both actual likelihood (given past history on this and similar trails) and also (potentially more importantly) perceptions of safety by potential trail users. This is particularly relevant in cases where a large proportion of trail users are women, children and/or older community members.

While the creek aligned trail avoids the collision risks noted above, some users may perceive it as being less safe due to it being more isolated than the road aligned trail option.

4.6.3 Property Values

It is likely that the trail extension will have a positive impact on the value of land within the vicinity of the trail.

A small number of properties will arguably be negatively impacted by the trail extension if the creek alignment is chosen, due to the acquisition by Council of part of their land. However, it is noted that:

- Property owners will be compensated for the loss of their land.
- The acquired land on the edge of the properties, will not have a material impact on owners' lifestyles or the income generating potential of the land to the minimum extent necessary.
- No significant noise will be generated by trail users

In fact, it may be argued that the positive impacts of the creek aligned trail on property owners could be significant, as their properties will:

- Have direct access to the extended trail, and therefore the wider trail network.

- Have proximity to thriving and livable towns well supported by the trail.
- Abut a (healthier) creek and surrounding natural environment.

4.6.4 Patronage of Local Businesses

Local businesses are likely to benefit from the extension of the Diamond Creek trail, in particular cafes who offer coffees, drinks and food for trail users. However, as noted in the Nillumbik Destination Management Plan (2015), in order to fully capture this economic benefit, local businesses may need to make investments to make their premises more attractive to trail users, especially cyclists. Examples include provision of outdoor seating and bicycle parking facilities.

4.7 Benefits Summary by Alignment

A breakdown of the anticipated benefits is shown in Table 4.2. The benefits are further assessed as to their potential given the two alignment options.

Table 4.2: Benefit Summary

Category	Benefits Summary			Conclusion – trail providing greater benefit
	Potential Trail Benefit	Would benefit be realised with a road aligned trail?	Would benefit be realised with a creek aligned trail?	
Health and Wellbeing				
Exercising (running, cycling, walking)	Provides opportunities for passive (casual) exercise at no or minimal cost	Yes, • However some users may be deterred by the interruptions presented by road and driveway crossings	Yes, • Provides opportunity for largely uninterrupted exercise program as there is only one road crossing (in Wattle Glen) • Greater potential for the incorporation of additional exercise opportunities e.g. cross training infrastructure	Creek Alignment
Leisure travellers (e.g. family enjoyment)	Provide off road, dedicated leisure facility, opportunities to meet up and socialise with family and friends	May be less attractive to leisure users due to : • Road noise • Interaction with vehicles at crossings • Limited shade However: • Easy access to cafes, shops for drinks, breaks etc. • Access to public toilets in shopping centres • Easy to enter and leave trail at any point	Yes, • Likely to be more aesthetically pleasing than road aligned trail due to tree canopy • Variety of surfaces – concrete, toppings, boardwalk, bridge – provides variety • More scenic than travel along a roadway However: • Less accessible to refreshments, toilets, other amenities	Creek Alignment
Horse riders	Provides separated facility for horse riders	Unable to provide separate horse-suitable surface to prevent conflict with other users Road traffic likely to deter horse riders due to speed and volume	Yes, • Separate 2m wide natural surface horse trail provided with 2m clearance to concrete trail • Away from road and therefore vehicle noise – may be more appealing to horse riders Assuming that: • Trail links to facilities which allow for parking of horse floats	Creek Alignment

Category	Benefits Summary			Conclusion – trail providing greater benefit
	Potential Trail Benefit	Would benefit be realised with a road aligned trail?	Would benefit be realised with a creek aligned trail?	
Community	Benefits to businesses and employers due to healthier staff who are less prone to use of sick leave. Long term reduction in demand on health systems due to unfit lifestyle-related illnesses.	Benefit dependent on attractiveness of trail to users, and whether or not trail users are new or switch from other trails.	Benefit dependent on attractiveness of trail to users, and whether or not trail users are new or switch from other trails.	Both
Safety				
Road accidents	Take pedestrians, cyclists and riders off road – remove risk of collisions with vehicles	Trail to be separated from road traffic with barriers and fencing, but road aligned trail still requires users to cross roads and driveways at numerous points	Yes, no interaction with vehicles	Creek alignment
Trail accidents	Potential for injury while using trails due to: ○ Inadequate trail width ○ Uneven trail surfaces ○ Poorly maintained trail surfaces ○ Ped/Cyclist/Horse rider collisions	Relative benefits depends on design including trail width, passing opportunities	Creek alignment provides separate trail for horses Other relative benefits depend on design including trail width, passing opportunities	Creek alignment
Personal safety (e.g. assaults)	Refers to both actual and perceived safety	May be perceived as safer as: ○ Passes through populated and potentially busy retail areas ○ Trail users have line of sight to roads and houses ○ Passive surveillance	May be perceived as less safe as more isolated May be difficult for emergency vehicles to access parts of trail	Road/creek alignment
Travel Cost Savings				
Switch from vehicle to trail use	Integrated trail encourages switch from vehicle to active travel for some commuters	Take up dependant on a number of factors, including: ○ Proximity of trail to homes and workplaces ○ Directness of route ○ Supporting facilities in workplaces, e.g., bike racks, showers, lockers	Take up dependant on a number of factors, including: ○ Proximity of trail to homes and workplaces ○ Directness of route Supporting facilities in workplaces, e.g., bike racks, showers, lockers	Undetermined

Category	Benefits Summary			Conclusion – trail providing greater benefit
	Potential Trail Benefit	Would benefit be realised with a road aligned trail?	Would benefit be realised with a creek aligned trail?	
Environmental				
Reduced congestion and pollution	Takes vehicles off road, to be replaced by active forms of commuter travel	Some benefits if local commuters and school related trips utilise trail	Some benefits if local commuters and school related trips utilise trail	Both
Environmental management of creek corridor	Creek corridor coming under Council ownership and management would allow for actions to improve waterway health, stabilise banks and protect animal habitats.	No	Yes	Creek alignment
Wider Economic Benefits				
Patronage of local businesses	Potential increase in demand for businesses such as cafes, pubs and small retail shops	Yes, some benefit to businesses located along the trail but main benefit will be to businesses in Hurstbridge and Diamond Creek (end of trail)	Yes, but more limited as trail runs through bushland and therefore away from retail areas Main benefit will be to businesses in Diamond Creek and Hurstbridge (end of trail)	Road/Creek alignment
Demand for active travel related businesses	Potential demand for retail businesses associated with walking, cycling, running	Yes	Yes, but more limited as trail runs through bushland and therefore away from retail areas Those more likely to benefit are those located at key trail entry and exit points	Road/creek alignment
Improved land values	Intangible, possible to estimate longer term via property price impact (although discrete trail impacts would be difficult to isolate)	Some benefit of proximity to an integrated recreation network but road aligned trail may be less attractive to users who seek a 'back to nature' experience	Yes, likely to be improved but difficult to quantify	Creek alignment

4.8 Quantification, Weighting and Conclusions

4.8.1 Quantification of Benefits

In conducting a benefits analysis, it is desirable to quantify benefits in order to provide a monetary comparison of proposed options.

However, in this instance, it has not been possible to quantify the benefits of the proposed creek and road aligned trails, for the following reasons.

- The available demand forecasts relate to a generic trail in the area, rather than to a specific alignment.
- The profile of trail users and trip purposes in the area (recreational users rather than commuters) means that the benefits likely to accrue are more qualitative (e.g., exercise benefits, back to nature experience) than quantitative (e.g., VTTS, VOC savings) in nature.

This does not, however, prevent conclusions being drawn regarding which trail is likely to provide the greater benefit to the community. This is discussed below.

4.8.2 Weightings and Conclusions

As shown by the analysis in Section 5 above, there are benefits for the Council from both the creek and road/creek trail options. The key conclusions from the benefits analysis are as follows.

- Both trail alignments would cater for users wishing to exercise or use the trail for leisure purposes, although the creek aligned trail would be likely to be more aesthetically attractive and therefore likely to attract more users.
- The creek aligned trail would provide greater intangible benefits to users, including the sense of wellbeing that comes from access to open spaces, nature and quiet surroundings.
- The creek aligned trail would generate greater safety-related benefits, as users would be wholly removed from interactions with road crossings and therefore vehicles.
- The creek aligned trail, in catering for all user groups, could generate greater safety benefits than the road aligned option (which would not be suitable for horses).
- The selection of a (road aligned) trail that fails to provide for some users (horse riders) may be negatively perceived by sections of the community.
- Although the creek aligned trail, if isolated or semi isolated, could present personal safety issues, this risk could be addressed through the cutting back of heavy foliage.
- A creek aligned trail, which involves the acquisition by Council of sections of private land along the creek, could assist Council in realising environmental and ecological objectives.

The above summary suggests that a creek aligned trail would provide greater benefits to users and Council than would a trail aligned to the road. This conclusion is further supported by the fact that recent survey respondents nominated preferences (e.g., relaxation, leisure) that are clearly better delivered through a creek aligned trail than one that follows the road.

Given the above, it can be concluded that the creek alignment offers the better opportunity for Council to provide a facility that meets community expectations and realises potential benefits.

5. Recommendation and Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The trail extension is consistent with state, regional and local strategies. Further, its importance is highlighted by the fact that it is singled out as a key priority in a number of strategy documents.
- The extension will provide the key (currently missing) link to a number of other trails within the network.
- There are clear social and economic benefits to be realised via the trail extension.
- The potential trail patronage demand is 358,485 users per annum. Given the available data it is not possible to quantify a difference in demand between a road side and creek side option, however surveyed data suggests a creek aligned option would be have a higher demand.
- The costs of a creek aligned trail exceed those of the road alignment option, largely due to the land acquisition costs as shown in Table 5.1.

Table 5.1: Expected Total Cost of Creek and Road Side Options

Option	GTA Expected Total Cost
Road/Creek Alignment (Concrete)	$8,768,768
Creek Alignment (Preferred Alignment)	$10,891,542

- There are benefits for the Council from both the creek and road-aligned trail options. A summary of the benefits and the trail which provides a greater benefit is shown in Table 5.2.

Table 5.2: Benefits Summary

Category	Conclusion – trail providing greater benefit
Health and Wellbeing	
Exercising (running, cycling, walking)	Creek Alignment
Leisure travellers (e.g. family enjoyment)	Creek Alignment
Horse riders	Creek Alignment
Community	Both
Safety	
Road accidents	Creek alignment
Trail accidents	Creek alignment
Personal safety (e.g. assaults)	Road/creek alignment
Travel Cost Savings	
Switch from vehicle to trail use	Undetermined
Environmental	
Reduced congestion and pollution	Both
Environmental management of creek corridor	Creek alignment
Wider Economic Benefits	
Patronage of local businesses	Road/creek alignment
Demand for active travel related businesses	Road/creek alignment
Improved property values	Creek alignment

- While there is limited opportunity for economic/retail activity on the road side in form of café patronage etc., it is likely that the creek alignment would provide greater intangible benefits to users, including the sense of wellbeing that comes from access to open spaces, nature, quiet etc. Recent surveys indicate that these intangible benefits are highly rated by trail users.
- Safety of users on trails is also paramount. While isolated or semi isolated tracks can be of particular concern, it is possible to largely mitigate this risk and alleviate public concerns e.g. cutting back of heavy foliage. Further, the creek trail provides the benefit of taking trail users away from road crossings, which represents a safety benefit by removing interaction between trail users and vehicles on road.
- Given the above, it can be concluded that the creek alignment offers the better opportunity for Council to provide a facility that meets community expectations and realises potential benefits.

Appendix A

Cost Summary

Creek Side - Preferred Alignment		
	Description	**Cost**
1	Investigation	35,500.00
2	Land Acquisition	
3	Construction Works	
3.1	Setup and Management	80,000.00
3.2	Breakout and Clearing	35,000.00
3.3	Earthworks	178,500.00
3.4	Concrete Works	1,980,000.00
3.5	Signing and Line marking	15,250.00
3.6	Reinstatement	162,000.00
3.7	Landscaping Works	30,000.00
3.8	Boardwalks	600,000.00
3.9	Pedestrian Bridges	1,520,000.00
3.10	Fencing	290,000.00
3.11	Drainage	11,520.00
3.12	Services	15,000.00
4	Total (Excluding GST)	**$4,952,770.00**
5	Sub Total (with 30% contingency, 6% design, 4.5% supervision)	**$6,958,641.85**
7	Land acquisition	**$3,932,900.00**
	Estimate Total	**$10,891,541.85**

Road Side Option: Diamond Creek to Wilson Reserve, Wattle Glen		
	Description	**Cost**
1	Reinforced concrete trail 3m wide	$1,366,560
2	Asphalt trail 3m wide	$911,040
3	Train level crossing	$600,000
4	Pedestrian / bicycle crossing lamps	$60,000
5	Relocate street light pole	$10,000
6	Pedestrian crossing	
7	Bicycle crossing hoop	$13,750
8	Raised crossing	$60,000
9	Zebra crossing	$4,000
10	Retaining walls 2 sleepers high	$130,000
11	Car wheel stops	$3,250
12	Post and wire fencing (one side of trail)	$3,300
13	Wilson Road bridge: relocate pedestrian walkway to other side of bridge	$15,000
14	Sub total	
14.1	Concrete Trail	**$2,265,860**
14.2	Asphalt Trail	**$1,810,340**
15	Sub Total (with 30% contingency, 6% design, 4.5% supervision)	
15.1	Concrete Trail	**$3,183,533**
15.2	Asphalt Trail	**$2,543,528**
Road Side Option (Creek aligned section): Wilson Reserve, Wattle Glen to Hurstbridge		
	Description	**Cost**
1	Reinforced concrete footpath	$1,200,000
2	Timber board walks with plastic decking	$300,000
3	Post and wire fencing (both sides of trail)	$297,000
4	Pedestrian bridges	$560,000
5	Pedestrian bridges (CFA Access)	$400,000
6	Drainage works	$25,000
7	Earth works	$80,000
8	Other activities	$125,000
9	Land acquisition costs	TBC
10	Sub Total	
10.1	Concrete Trail	**$2,987,000**
11	Sub Total (with 30% contingency, 6% design, 4.5% supervision)	
11.1	Concrete Trail	**$4,196,735**
12	Land Acquisition	$1,388,500
	TOTAL (concrete)	**$5,585,235**
Road Side Option TOTAL : Diamond Creek to Hurstbridge		
14	**Total**	
14.1	**Concrete**	**$8,768,768**
14.2	**Asphalt**	**$8,128,763**

Appendix B

Preferred Creek Trail Alignment Map

LAND ACQUISTION SUMMARY

Code	Property Address	approx land required m2
1	142 Broadgully Rd, Diamond Creek	22,000
1c	185 Main Hurtsbridge Rd, Diamond Creek	1,500
2	22 Herberts Lane, Diamond Creek	4,000
3	201 Main Hurstbridge Rd, Diamond Creek	6,200
4	203 Main Hurstbidge Rd, Diamond Creek	6,000
5	86 Wilson Rd Wattleglen	56,000
5a	26 Herberts Lane, Diamond Creek	4,000
6a	65-135 Wilson Rd, Wattleglen	9,500
6b	65-135 Wilson Rd, Wattleglen	9,200
6c	65-135 Wilson Rd, Wattleglen	5,000
7	673 Heidelberg-Kinglake Rd, Hurstbridge	6,000
7a	673 Heidelberg-Kinglake Rd, Hurstbridge	3,000
7b	687 heidelberg - Kinglake Rd, Hurstbridge	5,000
7c	675-685 Heidelberg-Kinglake Rd, Hurstbridge	20,000
8	645 Heidelberg - Kinglake Rd, Hurstbridge	2,800
	TOTAL	**160,200**

DIAMOND CREEK

1
No.142 BROAD GULLY ROAD
PRIVATE LAND ACQUISTION
APPROX 22,000 SQM

2
No.22 HERBERTS LANE
PRIVATE LAND ACQUISTION
APPROX 4000 SQM

1c
PRIVATE LAND ACQUISTION
APPROX 1500 SQM
No.185
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK

3
No.201
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK
PRIVATE LAND ACQUISTION
APPROX 6,200 SQM

4
No.203
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK
PRIVATE LAND ACQUISTION
APPROX 6,000 SQM

5a
No.26 HERBERTS LANE
DIAMOND CREEK
PRIVATE LAND ACQUISTION
APPROX 4,000SQM

5
86 WILSON RD
WATTLEGLEN

PEDESTRIAN BRIDGE

BUILDING

HERBERTS LANE

TRAIN TRACK

MAIN HURSTBRIDGE RD

1 in 100

CREEK

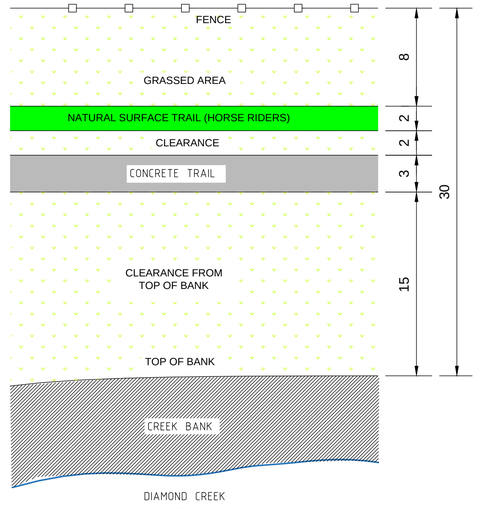
DIAMOND

matchline

86 WILSON ROAD
WATTLE GLEN

No.235
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK

No.219A
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK



DIAMOND CREEK TO HURSTBRIDGE OFF ROAD TRAIL
TYPICAL LAYOUT PLAN - scale 1:250

REF	REVISION	DATE	APP'D
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LEGEND

- Ex. Water Main & Valve
- Ex. Gas Main
- Ex. U/G Electrical Cable
- Ex. Sewer Main & Manhole
- Ex. U/G Telecom Cable & Pit
- Ex. Stormwater Drain & Pit
- Ex. Power Pole & O/H Lines
- Ex. Telstra Pole & O/H Lines
- Open Table Drain
- Stormwater Drain & Pit
- Property Inlet Connection
- House Drain Connection
- Ex. Sign / Proposed Sign
- Limit of Works
- Fence
- Tree / Tree to be removed
- Fire Hydrant (above ground)
- Fire Hydrant (ground level)
- Permanent Survey Mark
- Temporary Bench Mark
- Station Mark / Proposed Light
- Ex. Light / Ex. Pole and Stay
- Batters
- Planting Area
- Asphalt Road Seal
- Asphalt Crossover
- Concrete kerb & channel
- N5101.00 Existing Surface Level
- K86.220 Design Top of Kerb Level
- [21.650] Finished Surface Level
- P86.220 Design Pavement Level
- Filling Deeper Than 300mm
- Concrete Path
- Proposed boardwalks (approximate)
- Proposed land acquisition boundary
- Proposed pedestrian bridge crossing
- Proposed areas for land acquisition

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Manager Infrastructure Development
Date 1 / 10 / 2014
Signature

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DIAMOND CREEK TRAIL
DIAMOND CREEK SECTION
LAYOUT PLAN

Associated Drawings
DATE: FEBRUARY 2016
SHEET 1 OF 5
DRAWING NO. 15011

matchline

matchline

1 in 100

5

86 WILSON RD
WATTLEGLEN

PRIVATE LAND ACQUISTION
APPROX 56,000SQM

1 in 100

DIAMOND CREEK

No.144 WILSON ROAD
WATTLE GLEN

1 in 100

1 in 100

5

86 WILSON RD
WATTLEGLEN

PRIVATE LAND ACQUISTION
APPROX 56,000SQM

DIAMOND CREEK

DIAMOND CREEK

No.255
MAIN HURSTBRIDGE ROAD
DIAMOND CREEK

1 in 100

BUILDING

BUILDING

TRAIN TRACK

MAIN HURSTBRIDGE RD

matchline

matchline

ILSON RD
TLEGLEN

5

OND CREEK

REF	REVISION	DATE	APP'D
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LEGEND

- Ex. Water Main & Valve
- Ex. Gas Main
- Ex. U/G Electrical Cable
- Ex. Sewer Main & Manhole
- Ex. U/G Telecom Cable & Pit
- Ex. Stormwater Drain & Pit
- Ex. Power Pole & O/H Lines
- Ex. Telstra Pole & O/H Lines
- Open Table Drain
- Stormwater Drain & Pit
- Property Inlet Connection
- House Drain Connection
- Ex. Sign — Proposed Sign
- Limit of Works — Fence
- Tree — Tree to be removed
- Fire Hydrant (above ground)
- Fire Hydrant (ground level)
- Permanent Survey Mark
- Temporary Bench Mark
- Station Mark — Proposed Light
- Ex. Light — Ex. Pole and Stay
- Batters
- Planting Area
- Asphalt Road Seal
- Asphalt Crossover
- Concrete kerb & channel
- NS101.00 Existing Surface Level
- K86.220 Design Top of Kerb Level
- 21.650 Finished Surface Level
- P86.220 Design Pavement Level
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Manager Infrastructure Development
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DIAMOND CREEK TRAIL

DIAMOND CREEK SECTION

LAYOUT PLAN

Associated Drawings

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WATTLE GLEN

NILLUMBIK SHIRE COUNCIL

NIMMO ROAD

WILSON ROAD

137 WILSON RD WATTLE GLEN

No.137 WILSON ROAD WATTLE GLEN

No.65–135 WILSON ROAD WATTLE GLEN

No.137A WILSON ROAD WATTLE GLEN

DIAMOND CREEK

TRAIN TRACK

MAIN HURSTBRIDGE RD

1 in 100

PROPOSED - ADDITIONAL 15M WIDTH TO THE EXISTING COUNCIL RESERVE 1

PRIVATE LAND ACQUISTION APPROX 9,500SQM

MUNICIPAL PURPOSES RESERVE No.1

BUILDING

6a

LEGEND

- Ex. Water Main & Valve
- Ex. Gas Main
- Ex. U/G Electrical Cable
- Ex. Sewer Main & Manhole
- Ex. U/G Telecom Cable & Pit
- Ex. Stormwater Drain & Pit
- Ex. Power Pole & O/H Lines
- Ex. Telstra Pole & O/H Lines
- Open Table Drain
- Stormwater Drain & Pit
- Property Inlet Connection
- House Drain Connection
- Ex. Sign / Proposed Sign
- Limit of Works / Fence
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- Fire Hydrant (above ground)
- Fire Hydrant (ground level)
- Permanent Survey Mark
- Temporary Bench Mark
- Station Mark / Proposed Light
- Ex. Light / Ex. Pole and Stay
- Batters
- Planting Area
- Asphalt Road Seal
- Asphalt Crossover
- Concrete kerb & channel
- NS101.00 Existing Surface Level
- K86.220 Design Top of Kerb Level
- FL85.50 Finished Surface Level
- P86.220 Design Pavement Level
- Filling Deeper Than 300mm
- Concrete Path
- Proposed boardwalks (approximate)
- Proposed land acquistion boundary
- Proposed pedestrian bridge crossing
- Proposed areas for land acquistion

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Manager Infrastructure Development
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DIAMOND CREEK TRAIL

WATTLEGLEN SECTION

LAYOUT PLAN

Associated Drawings

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SHEET 3 OF 5

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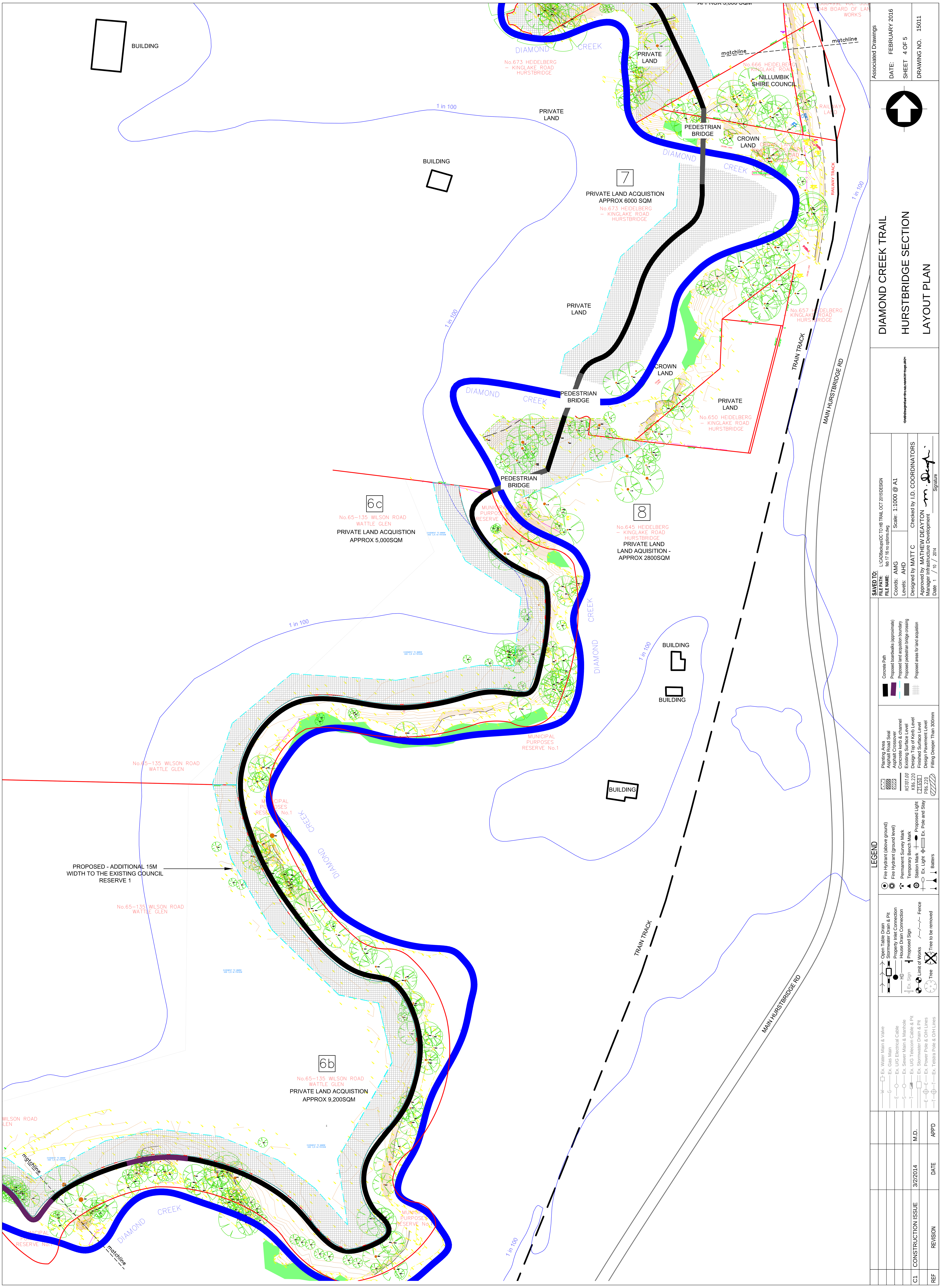

BUILDING
PRIVATE LAND
1 in 100
BUILDING
DIAMOND CREEK
No.673 HEIDELBERG – KINGLAKE ROAD HURSTBRIDGE
PRIVATE LAND
matchline
No.666 HEIDELBERG – KINGLAKE ROAD
NILLUMBIK SHIRE COUNCIL
PEDESTRIAN BRIDGE
CROWN LAND
RAILWAY TRACK
7
PRIVATE LAND ACQUISTION APPROX 6000 SQM
No.673 HEIDELBERG – KINGLAKE ROAD HURSTBRIDGE
1 in 100
PRIVATE LAND
No.657 HEIDELBERG KINGLAKE ROAD HURSTBRIDGE
TRAIN TRACK
MAIN HURSTBRIDGE RD
CROWN LAND
PRIVATE LAND
No.650 HEIDELBERG – KINGLAKE ROAD HURSTBRIDGE
PEDESTRIAN BRIDGE
PEDESTRIAN BRIDGE
6c
No.65–135 WILSON ROAD WATTLE GLEN
PRIVATE LAND ACQUISITION APPROX 5,000SQM
MUNICIPAL PURPOSES RESERVE
8
No.645 HEIDELBERG – KINGLAKE ROAD HURSTBRIDGE
PRIVATE LAND LAND AQUISITION - APPROX 2800SQM
1 in 100
BUILDING
BUILDING
BUILDING
MUNICIPAL PURPOSES RESERVE No.1
No.65–135 WILSON ROAD WATTLE GLEN
PROPOSED - ADDITIONAL 15M WIDTH TO THE EXISTING COUNCIL RESERVE 1
No.65–135 WILSON ROAD WATTLE GLEN
6b
No.65–135 WILSON ROAD WATTLE GLEN
PRIVATE LAND ACQUISITION APPROX 9,200SQM
TRAIN TRACK
MAIN HURSTBRIDGE RD
WILSON ROAD GLEN
matchline
matchline
1 in 100
DIAMOND CREEK
Associated Drawings
DATE: FEBRUARY 2016
SHEET 4 OF 5
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DIAMOND CREEK TRAIL
HURSTBRIDGE SECTION
LAYOUT PLAN
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Manager Infrastructure Development
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Concrete Path
Proposed boardwalks (approximate)
Proposed land acquisition boundary
Proposed pedestrian bridge crossing
Proposed areas for land acquisition
Planting Area
Asphalt Road Seal
Asphalt Crossover
Concrete kerb & channel
Existing Surface Level
Design Top of Kerb Level
Finished Surface Level
Design Pavement Level
Filling Deeper Than 300mm
LEGEND
Fire Hydrant (above ground)
Fire Hydrant (ground level)
Permanent Survey Mark
Temporary Bench Mark
Station Mark
Ex. Light
Proposed Light
Ex. Pole and Stay
Batters
Open Table Drain
Stormwater Drain & Pit
Property Inlet Connection
House Drain Connection
Proposed Sign
Ex. Sign
Limit of Works
Fence
Tree
Tree to be removed
Ex. Water Main & Valve
Ex. Gas Main
Ex. U/G Electrical Cable
Ex. Sewer Main & Manhole
Ex. U/G Telecom Cable & Pit
Ex. Stormwater Drain & Pit
Ex. Power Pole & O/H Lines
Ex. Telstra Pole & O/H Lines
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DIAMOND CREEK

WADESON ROAD

PRIVATE LAND ACQUISITION APPROX 20,000 SQM

7c

No.673 - 685 HEIDELBERG - KINGLAKE ROAD HURSTBRIDGE

No.55 WADESON ROAD HURSTBRIDGE

1 in 100

PEDESTRIAN BRIDGE

NILLUMBIK SHIRE COUNCIL 2.9 HA RESERVE

723 HEIDELBERG - KINGLAKE RD

HURSTBRIDGE

No.50 GRAYSHARPS ROAD HURSTBRIDGE

NILLUMBIK SHIRE COUNCIL

PRIVATE LAND

PRIVATE LAND ACQUISITION APPROX 5,000 SQM

7b

No.687 HEIDELBERG - KINGLAKE ROAD HURSTBRIDGE

PRIVATE LAND ACQUISITION APPROX 3,000 SQM

7a

No.673 HEIDELBERG - KINGLAKE ROAD HURSTBRIDGE

matchline

BUILDING

GOVERNMENT ROAD

VIC TRACK EASEMENT

TRAIN TRACK

MAIN HURSTBRIDGE RD

(PART) LOT 1 ON TP 358499E VOL 3556 FOL 048 BOARD OF LAND AND WORKS

LEGEND

- Ex. Water Main & Valve
- Ex. Gas Main
- Ex. U/G Electrical Cable
- Ex. Sewer Main & Manhole
- Ex. U/G Telecom Cable & Pit
- Ex. Stormwater Drain & Pit
- Ex. Power Pole & O/H Lines
- Ex. Telstra Pole & O/H Lines
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Approved by MATHEW DEAYTON
Manager Infrastructure Development
Date 1 / 10 / 2014
Signature

DIAMOND CREEK TRAIL

HURSTBRIDGE SECTION

LAYOUT PLAN

Associated Drawings

DATE: FEBRUARY 2016

SHEET 5 OF 5

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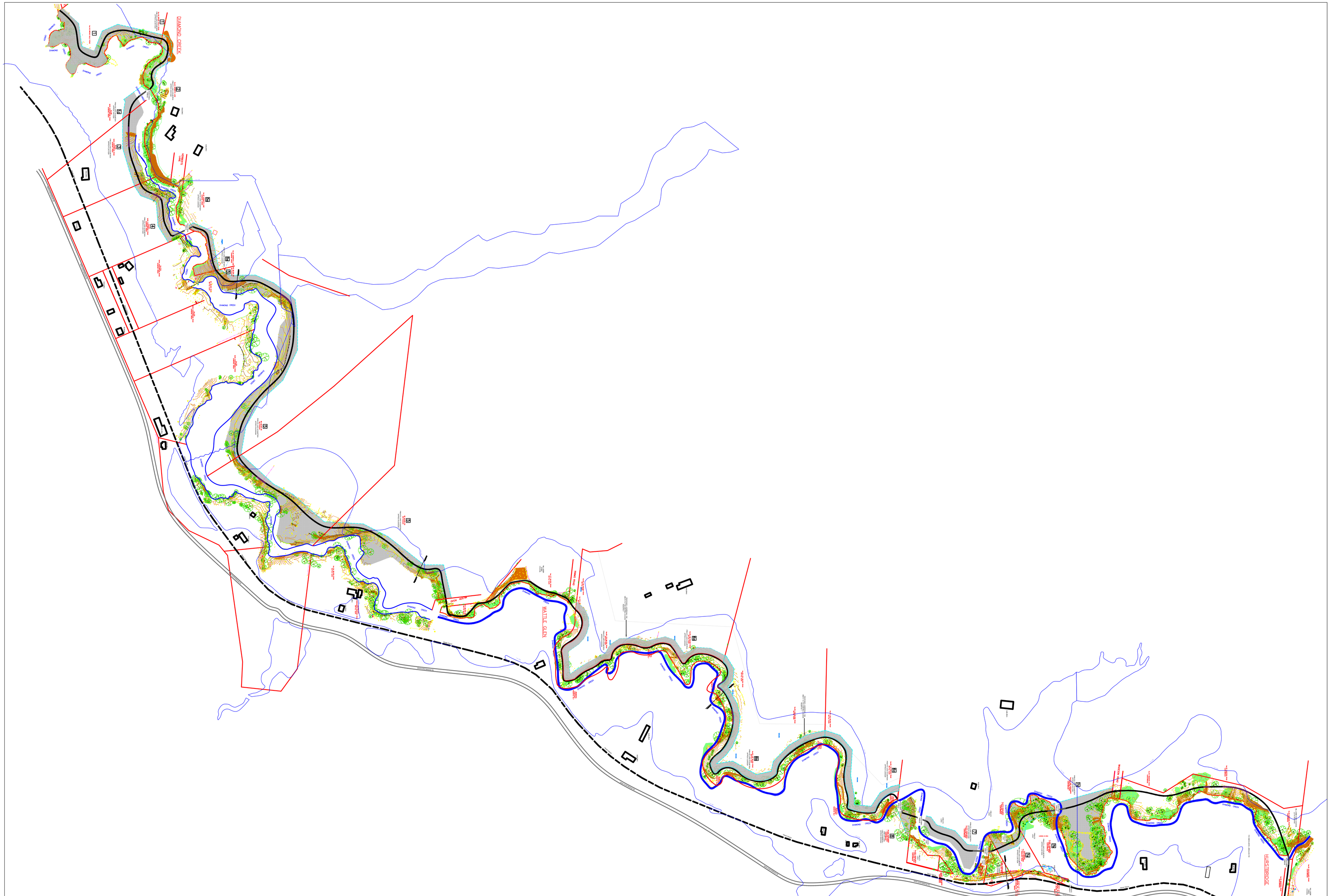

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- Ex. Gas Main
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- Ex. Stormwater Drain & Pit
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Manager Infrastructure Development
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DIAMOND CREEK TRAIL

OVERALL SITE PLAN

Associated Drawings

DATE: FEBRUARY 2016

SHEET 5 OF 5

DRAWING NO. 15011

Melbourne

A Level 25, 55 Collins Street
PO Box 24055
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BRISBANE QLD 4001
P +617 3113 5000
E brisbane@gta.com.au

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F +617 5510 4814
E goldcoast@gta.com.au

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E perth@gta.com.au