SUPPLEMENTARY BUSINESS PAPER

(Late Item Memo – Item 6)

GENERAL MEETING

Wednesday 11 May 2022
at 6:30PM

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SUPPLEMENTARY ITEMS

ITEM 6 **PC7/22** - Draft Byles Creek Planning Study - Report on Submissions

Additional information with CHANGE *to Recommendation*

The draft Byles Creek Planning Study and Implementation Plan referred to as attachments in Director's Report No. PC7/22 were not attached to the report due to an administrative error before finalisation of the business paper.

Accordingly, the draft Byles Creek Planning Study and Implementation Plan are attached to LM6/22 for consideration in conjunction with Director's Report No. PC7/22.

It is recommended that Council endorse the Byles Creek Planning Study and Implementation Plan as attached to this Late Item Information Memo report.

RECOMMENDATION

THAT:

1. Council endorse the Byles Creek Planning Study and associated Implementation Plan attached to the Late Item Information Memo No. LM6/22.
2. Restricted asset funds from the sale of 179 Beecroft Road, Cheltenham be used to fund the progression of the recommendations, including preparation of a Planning Proposal, Development Control Plan amendments and community awareness program.
3. Submitters be advised of Council's decision.

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Attachments:

1. Draft Byles Creek Planning Study

2. Implementation Action Plan - Byles Creek Planning Study

File Reference: F2020/00288

Document Number: D08399971

ITEM 6

ATTACHMENT 1 - ITEM 6

Byles Creek Planning Study

Client: Hornsby Shire Council
Date: 20 July 2021

ATTACHMENT 1 - ITEM 6

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Reviewed by	Hannah Bubb – Senior Consultant
Date	20 July 2021
Version	Final Draft

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FIGURES

Glossary

Term	Definition
Biodiversity	The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within and between species and ecosystems.
Corridor	A linear strip of vegetation that provides a continuous (or near continuous) pathway between two habitats.
Connectivity	The physical or functional capability of organisms to move between patches of habitat. These connections are often fragmented in urban environments; however, provide important ecological features and elements for species to migrate from one habitat to another to find food and shelter.
Ecological resilience	Ecological resilience is the capacity of an ecosystem to respond to a disturbance by resisting damage and recovering quickly. Resilience is dependent on components functioning.
Ecology / ecosystems	Ecology is the study of plants and animals, and their interaction with the environment. Urban ecology is the study of the relationship between living organisms and their environment in an urbanised context. Living organisms and the ecosystems they form are commonly termed 'biodiversity', a truncation of the words 'biological' and 'diversity'. Ecosystems comprise of natural components, such as plants, animals, water, soil, air and their interactions. Cities are urban ecosystems which include both nature and humans, in a predominately human-built environment. Functioning ecosystems are the foundation of human wellbeing and most economic activity.
Habitat	The physical environment where an organism or population naturally occurs. It includes all of the conditions an organism needs to survive; for example, for an animal, that means everything it needs to find and gather food, select a mate, and successfully reproduce. Urban habitat can be highly modified and are extremely diverse. They can vary from parks, to vacant lots, to degraded channels, to yards, golf courses, bridges, landfills.
Hollow bearing tree	A hollow-bearing tree is a dominant or co-dominant living tree, where the trunk or limbs contain hollows, holes or cavities. Such hollows may not always be visible from the ground but may be apparent from the presence of deformities such as protuberances of broken limbs, or where it is apparent the head of the tree has broken off. Hollows provide habitat for a range of species and are usually found in mature trees. The cavity opening size and depth varies, from small openings (2-6cm in diameter) to large (18-30cm in diameter).
Locally indigenous	Plants that occur naturally in the local area and are adapted to local rainfall and soil conditions. These will cover a range of forms from substantial trees to shrubs, groundcover and climbers. They provide an important habitat and food source for local wildlife.
Planning framework	Hornsby Shire Council's key planning polices which manage land use and development, including the *Hornsby Local Environmental Plan 2013* and the Hornsby Development Control Plan 2013.

Term	Definition
Riparian corridor	A riparian corridor is a zone of vegetation in and around the banks of a watercourse, lake or estuary. This vegetation stabilises the banks and riverbed and acts as a buffer restricting exotic species from entering the river. This is an essential element in retaining good water quality within a catchment area.
Stepping-stone habitat	One or more separate patches of habitat in the space between key habitat, that provide resources and refuge that assist animals to move through the landscape.
Study Area	The Study Area comprises private properties zoned R2 Low Density Residential surrounding the Byles Creek corridor public open space zoned land.

Common acronyms, terms and definitions

Term	Definition
APZ	Asset Protection Zone A cleared area surrounding a dwelling to reduce the risk of bushfire to the development and occupants.
CRZ	Core Riparian Zone The land within and adjacent to a watercourse
DA	Development Application
DCP	Development Control Plan A Development Control Plan (DCP) provides detailed planning and design guidelines to support the planning controls in the Local Environmental Plan (LEP). It identifies additional controls and standards for addressing development issues at a local level.
DPIE	The Department of Planning, Industry and Environment The Department of Planning, Industry and Environment is a department of the NSW Government responsible for effective and sustainable planning and the development of industry.
District Plan	North District Plan The North District Plan is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney.
EEC	Endangered Ecological Communities An ecological community listed as facing a very high risk of extinction and is protected in NSW under the *Biodiversity Conservation Act 2016*.
EP&A Act	*Environmental Planning and Assessment Act 1979* Is the principal legislation in New South Wales (NSW) governing how the relevant planning authority should take into consideration the impacts to the environment (both natural and built) and the community of proposed development or land-use change. Where other statutes are referenced in this document, they are spelled out in full.
E zones	Environmental Zones Many councils utilise Environmental zones (E zones) to regulate land uses in the Local Environmental Plan to better regulate protection of land with environmental, scenic values or were there are significant site constraints which limit development. The categories of E Zones include: > E1 National Parks and Reserves > E2 Environmental Conservation > E3 Environmental Management > E4 Environmental Living

Term	Definition
LEP	Local Environmental Plan A statutory planning document that guides planning decisions for local government areas. They do this through zoning and development controls, which provide a framework for the way land can be used.
LGA	Local Government Area Extent of the area governed by a particular council
LSPS	Local Strategic Planning Statement The 20-year vision for land use in the local area, the special character and values that are to be preserved and how change is managed in the future.
Region Plan	A Metropolis of Three Cities – the Greater Sydney Region Plan A metropolitan wide plan that sets a 40-year vision and establishes a 20-year plan to manage growth and change for Greater Sydney in the context of social, economic and environmental matters.
SEPP	State Environmental Planning Policy Planning instruments that deal with matters of State or Regional significance. The effect of a SEPP is that it can override local statutory controls (LEP) and can prohibit or allow certain types of development within a zone. It can also provide additional provisions to an LEP.
VB	Vegetated buffer Protects the environmental integrity of a riparian corridor

1 Executive Summary

Byles Creek Planning Study objectives

» There are a number of clear objectives for the Byles Creek Planning Study. These are to:

> Assess the suitability of the current planning controls in protecting the environmental qualities of the Byles Creek corridor area;

> Identify opportunities that will minimise the impact of residential development and reflect the environmental, social and aesthetic qualities of the adjoining the Byles Creek corridor; and

> Provide recommendations for improvements to Hornsby Shire's planning controls to protect the environmental, social and aesthetic qualities.

Significant environmental, social and aesthetic values

» The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area.

» The Byles Creek Study Area provides unique environmental characteristics and constraints including:

> Steep topography comprising predominantly steep terrain (greater than 20 degrees in some parts) resulting in limitations on urban development and associated risks, including greater bushfire, erosional, landslip and flood risk;

> Watercourses and supporting riparian corridors including several waterways and riparian zones in varied condition resulting in impacts on water quality and biodiversity, highlighting the importance of maintaining a vegetated buffer between residential development;

> Dominant soil profile predominantly comprising Hawkesbury – Colluvial soil, by virtue of its composition, is prone to increased sedimented stormwater discharge, erosion and degraded water quality;

> Bushfire prone land and steep topography which leads to significant Asset Protection Zone requirements resulting in increased tree removal and habitat destruction, as result of new development; and,

> Unique and significant habitat for more than 30 threatened flora species within a 5km radius of the Study Area.

» Byles Creek and surrounding land within the Study Area also contains significant biodiversity values, including:

> Critically Endangered Ecological Community Blue Gum High Forest;

> Regionally significant Coachwood Rainforest;

> Locally significant Blackbutt Gully Forest;

> Connectivity to Lane Cove National Park (biodiversity corridor);

> Habitat for threatened fauna including Powerful Owl, Red-crowned Toadlet, Little Bent-winged Bat and microbats;

> Habitat for the endangered Gang-gang Cockatoo population; and,

> Habitat for threatened flora including Brittle Midge Orchid (*Genoplesium bauera*) and Deane's Tea-tree (*Leptospermum deanei*).

Impacts of development to the Byles Creek corridor

» Key environmental and ecological impacts of residential development and occupation to the Byles Creek corridor include:

- Loss of habitat (including trees, understorey and ground cover vegetation);
- Fragmentation and edge effects as result of development and clearing for bushfire Asset Protection Zones (APZ);
- Water pollution into the catchment from increased runoff;
- Weed and feral animal invasion (such as foxes and feral cats); and
- Impacts from domestic animals (dogs and cats).

Stakeholder consultation outcomes

- The outcomes of the consultation with land owners, community interest groups and the broader community indicated general support for the intent and objectives of the Byles Creek Planning Study.
- The majority of stakeholders indicated that Hornsby Shire's planning controls were not doing enough to protect Byles Creek and considered that a reduction of development is considered appropriate to mitigate impacts.
- The key themes which emerged from the consultation process included:
  - Loss of canopy trees, vegetation and habitat;
  - Impact of habitat loss on native fauna and biodiversity corridor functionality;
  - Impacts of erosion, weed infestation and increased stormwater run-off; and
  - Visual impact on the scenic bushland setting.
- From these themes, some key opportunities to better protect and enhance the environmental and ecological qualities of Byles Creek emerged. These include:
  - Support for strengthening statutory planning controls through rezoning and increasing minimum lot size in the LEP, coupled with enhancement and better enforcement of planning controls in the DCP;
  - Support for community education programs and engagement in parallel with implementation of new planning controls; and
  - Acquisition of certain land within the Study Area.
- Despite the general support expressed for the intent and objectives of the Planning Study, there were concerns raised by a smaller proportion of landowners that the current planning controls are either sufficient or already too rigorous and therefore did not warrant any further restrictions. The key issues expressed by this group included concerns for:
  - Impact of new controls on property values and development potential of their land; and,
  - Further restrictions on tree removal for bushfire and asset protection and associated risks to human life and property.

Analysis of the local planning framework

- Overall, the environmental sections of the Hornsby Development Control Plan 2013 (DCP) and associated provisions are sufficiently robust with respect to achieving the integrity, functionality and preserving the environmental, ecological and scenic values of the Byles Creek corridor.
- The DCP planning controls are commensurate to the environmental, ecological and scenic values of the Byles Creek Study Area and comparable to environmental DCP planning controls implemented by other Councils, such as Sutherland Shire, Ku-ring-gai and Northern Beaches Councils.
- Notwithstanding the adequacy of the DCP controls, there is opportunity to better regulate the enhancement and protection of Byles Creek through strengthening the statutory planning controls in the *Hornsby Local Environmental Plan 2013* (LEP).

» Accordingly, the recommendations provided in the Planning Study are focused on implementation of new land use initiatives within the framework of the current LEP, supported by supplementary controls associated with the land in both the LEP and the DCP.

Recommendations

Based on findings of the background and literature review, and evaluation of the opportunities and outcomes of the community feedback received during the consultation period, the following provides recommendations for Council's local planning framework, and other supporting mechanisms, to enhance and protect the environmental values of Byles Creek on residential zoned land.

Environmental zoning

Recommendation 1 Re-zone land within the study area currently zoned R2 – Low Density Residential to E4 – Environmental Living as shown in the mapping below:

Justification

The E4 – Environmental Living Zone is for land with special environmental or scenic values and accommodates low impact residential development.

The Byles Creek Study Area encompasses unique environmental characteristics and constraints which supports the rezoning to E4 (detailed under **Part 5** of the Planning Study). The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area. The Study Area also provides steep terrain, watercourses and supporting riparian corridors and is highly bushfire prone.

Byles Creek and surrounding land within the Study Area also contains significant biodiversity values, including critically endangered ecological communities such as the Blue Gum High Forest and regionally significant Coachwood Rainforest. It provides known habitat for the endangered Gang Gang Cockatoo and threatened Powerful Owl.

It is proposed to only apply the E4 zoning to land currently zoned R2 within the Study Area, where:

- The majority of lots within the Study Area have an interface with the Byles Creek core corridor (i.e. land zoned RE1 – Public Recreation);
- The land generally provides high to medium environmental and ecological values, land constraints such as steep topography and bushfire affectation; and,
- The Study Area is readily defined where it is bounded by Malton Road, Sutherland Road, Azalea Grove, Kurrajong Street, and Lane Cove National Park.

Implementation of the E4 zone across residential land within the Study Area will ensure optimal land use outcomes that are both environmentally sustainable and facilitate low impact development. It will give Council greater regulatory control over developments that will impact or have potential to impact on environmental values of land.

There is reasonable consistency in the use of E4 zones across the Councils surveyed as part of the case studies (**Part 8**). E4 is mostly used where residential land has some extent native vegetation and or related environmental / scenic values such as proximity to waterways.

Furthermore, the proposed rezoning will meet the relevant objectives and provisions of Section 9.1 Ministerial Direction (3.1 – Residential Zones), where it:

- Retains provision to enable a variety and choice of housing types permissible in the current R2 zone;
- Minimises the impact of residential development on the environment;
- Will not impact upon the permissible density of land, (subject to strengthened environmental impact considerations); and
- Is supported by a planning study (this Study).

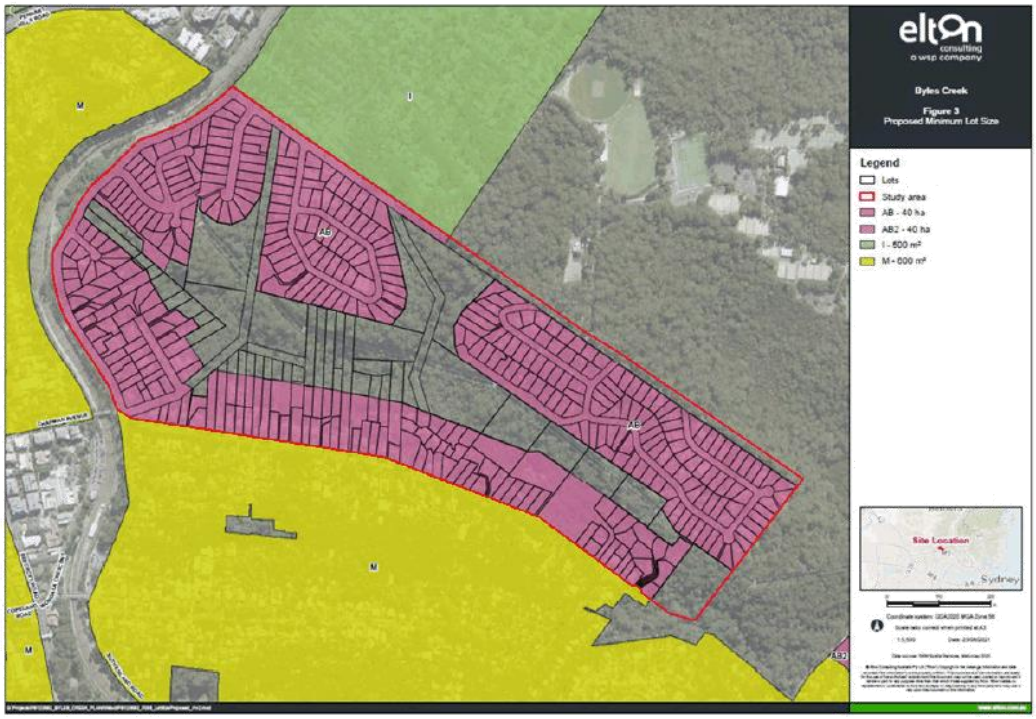
Economic Implications

The 'highest and best use' between R2 and E4 zoned land is similar and there are no proposed changes to the development controls associated with this recommendation. Accordingly, it is not anticipated that there will be any significant economic implications associated with the rezoning.

It will not trigger any additional development applications or restrictions but will identify matters to be considered in the assessment of DAs. Accordingly, it is not anticipated that there will be any significant economic implications associated with the rezoning.

Increase minimum subdivision lot size

Recommendation 2 Increase minimum lot size for land proposed to be zoned as E4 – Environmental Living to 40ha.



Justification

Increasing the minimum subdivision lot size is linked with the recommended E4 zoning, where the current minimum lot size of 600m^2 is not conducive to meeting the E4 zone objectives, which seek to enhance and protect the special environmental characteristics of the area.

Land currently zoned E4 under the Hornsby LEP 2013 provides a minimum lot size of 40ha. The proposed 40ha minimum subdivision lot size ensures consistency with application of the clause and ultimately would preclude any further subdivision within the Study Area.

A preliminary lot audit has been undertaken which indicates that there are only five (5) lots within the Study Area which have subdivision potential, many of which may have environmental constrains such as steep topography which would prevent subdivision under current planning controls.

Accordingly, it is considered that increasing the minimum subdivision lot size will not significantly impact the majority of landowners in terms of economic impacts of land value, however, is important to retain the integrity of the E Zone and consistency of the minimum lot size for E4 across the LGA.

Economic Implications

A lot audit undertaken by AEC concludes that only five (5) sites were identified to have potential for subdivision within the Study Area. Although there may be an economic impact (reduced land value) on an individual lot-by-lot basis, a change in the minimum lot size will have a minimal economic impact to the Study Area as a whole as most lots appear to be fully developed.

Strengthen minimum subdivision lot size objectives

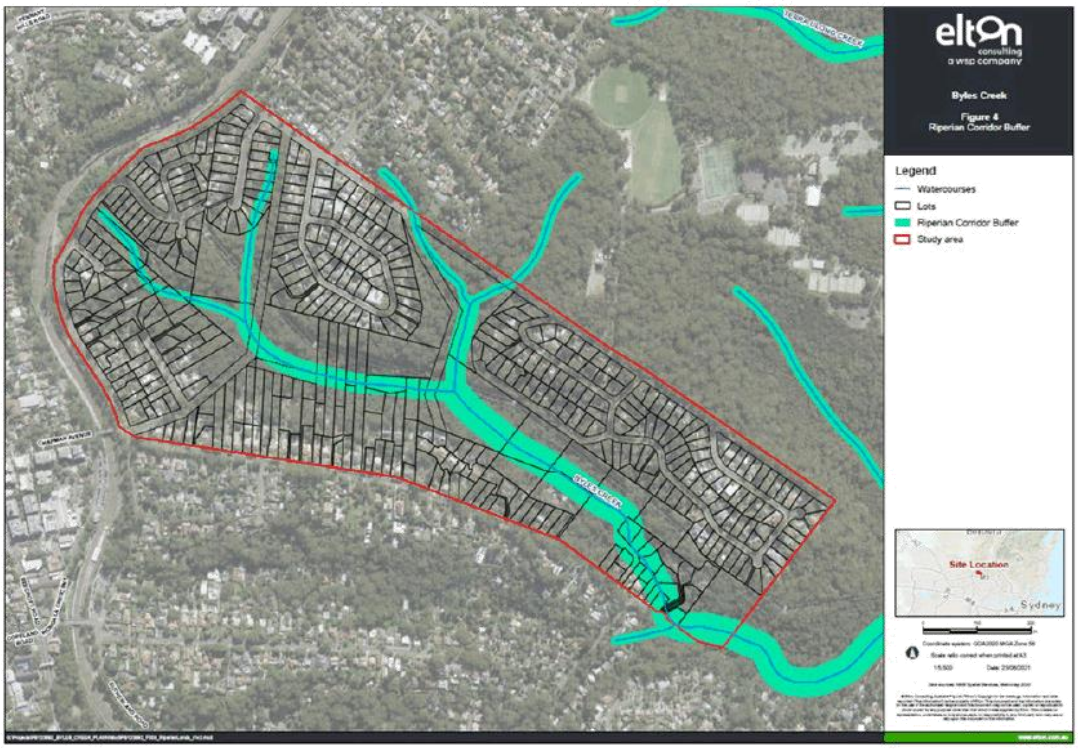
Recommendation 3 Strengthen the wording of Clause 4.1 objectives with the LEP to protect and enhance existing bushland and significant native vegetation.

Justification Enhancing the Minimum Subdivision Lot Size clause objectives would be applied more broadly across Hornsby Shire. Strengthening the clause objectives will ensure that adequate consideration is given to bushfire constraints and protection of bushland, biodiversity and significant landscape features, when considering proposed applications for subdivision.

Economic Implications An update to the objectives of Clause 4.1 is unlikely to impact the land values of private residential property owners in the Study Area. However, it may lead to additional environmental reports to be attached to future development applications, resulting in additional costs and time.

Riparian Land

Recommendation 4 Insert a new Local Provision Clause – Riparian Land into the Hornsby LEP 2013 and provide supporting riparian corridor mapping.



Justification It emerged from the environmental analysis (**Part 5**), supported by the stakeholder consultation, there are impacts from residential development on the existing Byles Creek riparian corridor.

The proposed Riparian Lands Clause in the LEP seeks to protect and maintain the ecological habitat accommodated by the waterways and associated riparian corridors within Byles Creek and the surrounding Study Area. It seeks to ensure that all

development along the riparian corridor have consideration for the environmental impacts to the waterway, as well as enhancing and re-establishing riparian vegetation and supporting important corridor linkages.

It presents a significant opportunity to mandate a riparian corridor which will assist to provision supporting habitat and enhance biodiversity linkages in this part of Hornsby Shire

The mapping should be based on the riparian mapping and assessment outlined **in Section 5.3** of the Planning Study incorporating first, second and third order watercourses which occur within the Study Area and prescribed Core Riparian Zone (CRZ) in accordance with the Strahler stream order classification system:

- 1st Order – 10m (each side of the watercourse)
- 2nd Order – 20m (each side of the watercourse)
- 3rd Order – 30m (each side of the watercourse)

This approach to riparian corridor buffers is consistent with the best practise guidelines for riparian corridors administered by the NSW Office of Water.

This will assist Council to more effectively maintain and rehabilitate riparian areas within the Study Area on private land and ensure appropriate buffer areas are applied to new development. This will enhance flora and fauna and bank stability, while reducing erosion and sediments entering the waterways and help reduce urban heat.

The new Riparian Land clause and supporting mapping will also ensure a consistent approach to protection, management and enhancement of the waterway and supporting habitat such as the incorporation of locally occurring riparian vegetation and can be applied more broadly across the LGA where waterways occur.

It will enable a more rigorous assessment where there are significant environmental values, as identified through mapping, or other values such as biodiversity.

In the context of Hornsby Shire, the key objectives provisions of the new Clause should seek to enhance and rehabilitate the connectivity of locally indigenous riparian vegetation along waterways and provide habitat to support native fauna. The Clause should provide requirements to ensure the objectives are achieved. Example wording is provided in **Part 10.2** of the Planning study.

The new clause and mapping will be readily supplemented by the current DCP prescriptive measures (pursuant to Part 1C.1.3 – Watercourses; Riparian Areas) which seek to provide 10m vegetated buffers to protect the integrity of the Core Riparian Zone (CRZ). Accordingly, it is recommended that the prescriptive measures reflect the mapping in the Hornsby LEP 2013 to enhance their application.

Economic Implications

A mapping overlay and accompanying clause does not change or otherwise affect the zoning of land or the permissibility of uses and only applies as a matter for consideration in the assessment of a development where an application would already be required.

Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, the new Clause and mapping overlay serves to further enforce riparian buffer provisions which exist in the DCP.

Accordingly, this recommendation is not expected to have a significant impact on land values to property owners in the Study Area.

Community engagement and awareness programs

Recommendation 5 Increase community engagement programs targeting the Study Area

Application

Community engagement programs may include (but should not be limited to):

- Preparation of guidelines and informative material, such as habitat creation for backyards
- Incorporation of interpretive signage to increase awareness and educate the community of the unique and significant flora and fauna which occur in the area (This can include signage relating to the presence of Critically Endangered Ecological Communities and habitat for threatened fauna including Powerful Owl).
- Coordination of community workshops and other interactive education programs with the assistance and support of State government grant funding
- Native plant giveaways (i.e. locally indigenous seedlings) for landowners within the Study Area
- Encouraging responsible ownership of domestic animals (e.g. dogs, cats) in accordance with the *NSW Companion Animals Act 1998* to avoid potential impacts to native fauna.

These community education programs should be undertaken in parallel with any changes to planning controls.

Justification

A key emerging theme from the background review and stakeholder consultation is the importance of increasing community awareness, foster a sense of ownership and obtain community 'buy-in", as well as personal connection to the natural environment through community education programs.

These initiatives align with the priorities and actions in the Hornsby Shire Council LSPS, Sustainable Hornsby 2040 and Biodiversity Conservation Strategy endorsed by Council.

Economic Implications

Community education programs will increase awareness and likely to result in a positive social outcome for the community and there is no perceived impact on land values to the property owners.

Notwithstanding, Council could potentially incur costs associated with education programs thus may require support through external funding (i.e. State government grants etc.).

2 Purpose of the Planning Study

The Byles Creek Planning Study (Planning Study) seeks to improve the Hornsby local planning framework to enhance and protect ecology, biodiversity and ecosystems within Byles Creek corridor.

Due to the high environmental quality, aesthetic and heritage value to the local community and the Shire in general, Hornsby Shire has commissioned a number of studies and reviews for the Byles Creek Corridor (refer to **Part 3.6** of this Planning Study). These studies and reviews have focused on larger areas than the area of which the current Planning Study relates.

To inform refined, considered and effective inputs into Council's existing local planning framework, including the *Hornsby Local Environmental Plan 2013* (Hornsby LEP) and Hornsby Development Control Plan 2013 (Hornsby DCP), we must now focus on private land which lies adjacent to the Byles Creek corridor where the impacts of future development would be the most significant. We must also elevate our thinking and consider the biodiversity and ecological values of Byles Creek in order to understand the interactions and dependencies within the ecosystem. Using a holistic approach, we can better understand the impacts of planning decisions and the associated trade-offs.

Healthy ecosystems and biodiversity are vital for the liveability and amenity of Hornsby Shire. We are currently contending with the most complex challenges in the history of Hornsby Shire's development. The way in which we can increase capacity to cope with a rapidly increasing population, increased development and plan for future climate change through resilience will fundamentally affect the native flora and fauna that lives within the Byles Creek ecosystem and the Hornsby Shire more broadly.

The Planning Study is not a comprehensive environmental assessment, rather it focuses on the key factors that affect land use planning within the prescribed Byles Creek Study Area and recommends planning measures to manage the impacts.

Figure 1 Blackbutt Gully Forest within the Byles Creek corridor

Source: Eco Logical Australia, 2021

3 About the Byles Creek Planning Study

3.1 Overview

Hornsby Shire Council's (Hornsby Shire's) natural environment is one of the hallmarks of the area. Hornsby Shire is known as the "Bushland Shire", not only for the Local Government Area's abundant bushland but for the biodiversity in flora and fauna, waterways and rural areas. Hornsby Shire's natural environment plays a vital role, not only for the Hornsby community but also for the region and Greater Sydney.

Extensive community engagement has been undertaken as part of the development of Community Strategic Plan and Environmental Sustainability Strategy. Feedback shows the Hornsby Shire community wants to ensure that local environments are protected and enhanced, and that Hornsby Shire is resilient and able to respond to climate change events and stresses.

Hornsby Shire has committed to progress a review of the planning controls for residential properties adjoining open space zoned land within the Byles Creek corridor. This review is the subject of the Planning Study. Council has engaged an experienced multidisciplinary team, led by Elton Consulting, with input from Eco Logical Australia and AEC, to undertake the Planning Study.

The Planning Study has given regard to protection and maintenance of the environmental and social values of the area. It investigates implementation measures to protect the biodiversity values and ecosystem functionality of the corridor.

Through the Planning Study, Council is seeking to understand how effective current planning controls are in protecting the interface between the public open space zoned area and the residential zoned land surrounding from fragmentation, increased runoff and loss of habitat (such as trees and vegetation). The outcomes of the Planning Study will be used to inform any recommendations for changes to planning controls, including the *Hornsby Local Environmental Plan 2013* (LEP) and the Hornsby Development Control Plan 2013 (DCP).

The Planning Study included consultation with landowners, community interest groups and the broader community to obtain input on the key environmental, economic, social and aesthetic attributes of the Byles Creek corridor. The engagement process also seeks to identify opportunities and constraints with existing and potential planning controls as well as other mechanisms for enhanced protection and management of the corridor.

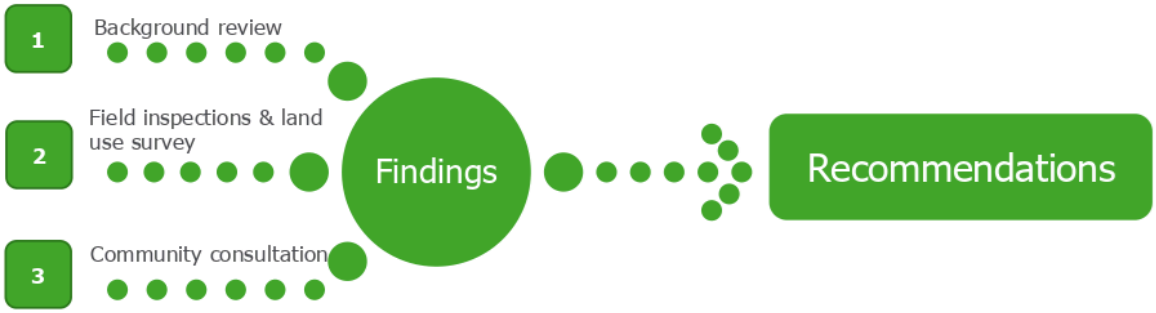
The Planning Study accounts for the significant landscape within the Byles Creek corridor, while at the same time, reviewing how residential properties surrounding the area can minimise impacts on the natural environment.

The method that underpins the Planning Study is comprised of five interlinked parts, summarised as follows:

1. **Existing Situation** – Background review of policies, studies and analysis of best practise case studies to develop an evidence base
2. **Land use survey and field inspections** – Environmental constraints and opportunities mapping and analysis of various attributes pertaining to the Study Area to support the evidence base
3. **Community consultation** – consultation with landowners, community and interest groups, as well as the broader community to obtain feedback and identify opportunities and constraints
4. **Analysis of information** – Analysis of planning controls from other comparable councils with respect to development on sites with an interface with environmentally sensitive / significant land within the Study Area
5. **Recommendations** – Synthesis of the above methodology, which consolidates all project work undertaken and provides recommendations and priorities for Council's planning framework and

supporting building techniques/designs to minimise environmental impacts on private land and the adjoining corridor.

The following illustrates the methodology of the Planning Study diagrammatically:



Some of the potential benefits that enhanced environmental outcomes can provide to the Byles Creek and the broader Hornsby Shire community include:

- **Environmental benefits** – Air pollution reduction, carbon storage, urban cooling, nutrient cycling, water filtration and moderation.
- **Human benefits** – Improved health, wellbeing and mental state, cultural and spiritual value, relaxation, shade, comfort, play and learning.
- **Ecological benefits** – Improved health of ecosystems, seed dispersal, pollination, insect control, improved species balance and diversity.
- **Economic benefits** – Energy savings, increased land value, increased productivity and creativity, reduced financial burden on health and emergency services.

3.2 Delivering on project objectives

There are a number of clear objectives for the Byles Creek Planning Study. These are to:

a) Assess the suitability of the current planning controls in protecting the environmental qualities of the Byles Creek corridor area;

b) Identify opportunities that will minimise the impact of residential development and reflect the environmental, social and aesthetic qualities of the adjoining the Byles Creek corridor; and

c) Provide recommendations for improvements to Hornsby's planning controls to protect the environmental, social and aesthetic qualities.

3.3 The Study Area

The Study Area comprises private properties zoned R2 Low Density Residential surrounding the Byles Creek corridor public open space zoned land (**Figure 2**). As indicated on the map, the Study Area is bounded by Malton Road, Sutherland Road, Azalea Grove, Kurrajong Street, and Lane Cove National Park.

Development generally comprises single or two storey detached dwellings. The majority of land along the existing Byles Creek corridor is zoned RE1 Public Recreation and comprises intact dense native vegetation.

Coastal Enriched Sandstone Moist Forest is the most represented vegetation community within the Byles Creek corridor. This community is associated with Blackbutt Gully Forest and is a locally significant community within the Hornsby Local Government Area.

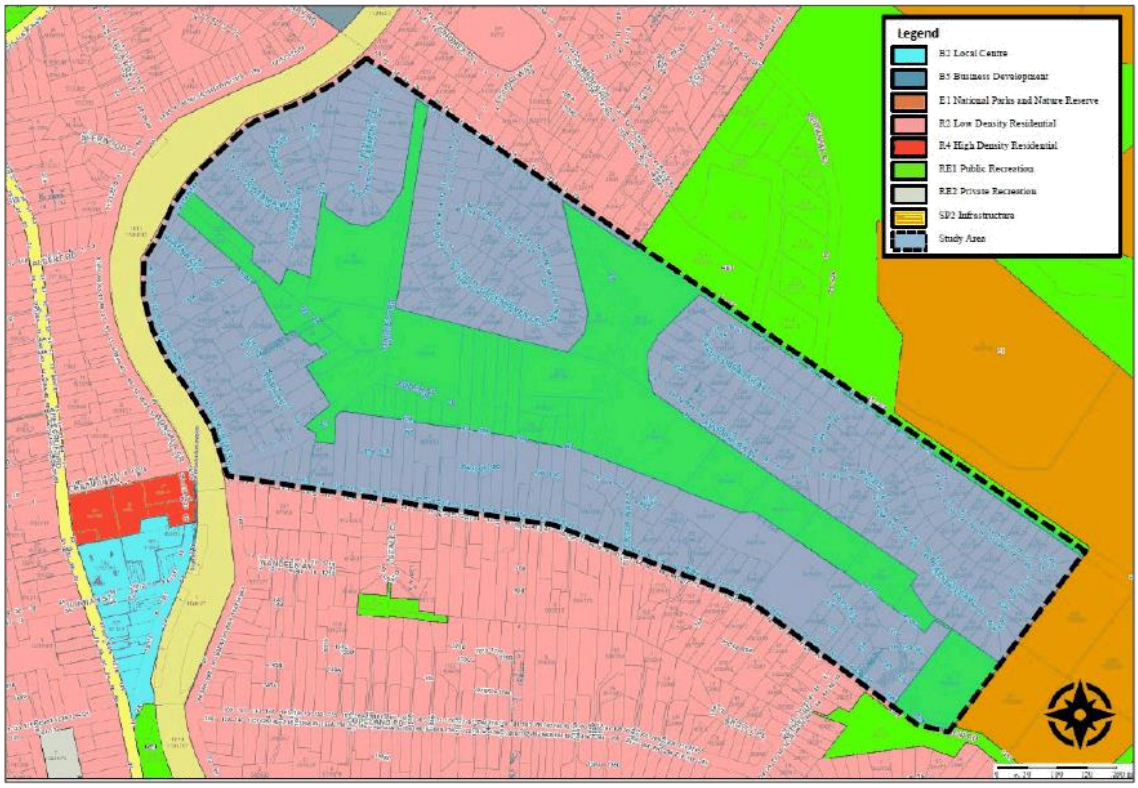
The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area. The corridor provides connectivity between the vegetation along Byles Creek and Lane Cove National Park. The connectivity of this corridor ensures the ability for native fauna to disperse between nearby reserves and the national park as well as providing habitat.

The corridor provides critical natural habitat to endangered and threatened local flora and fauna, such as the Powerful Owl, Gang Gang Cockatoo, Deane's tea-tree (*Leptospermum deanei*) and Blackbutt Smooth-barked Apple Tall Open Forest community. The corridor provides high biodiversity values as recognised by its inclusion within Council's Terrestrial Biodiversity Map (*Hornsby Local Environmental Plan 2013*).

The Study Area contains bushfire prone land and falls within the Beecroft-Cheltenham Heritage Conservation Area, as well as containing several heritage listed properties.

Potential impacts to the Byles Creek corridor within the Study Area include further loss of habitat (including trees, understorey and ground cover vegetation), fragmentation and edge effects as result of development and clearing for bushfire Asset Protection Zones (APZ), pollution into the catchment from increased runoff, weed and feral animal invasion (such as foxes and feral cats).

Figure 2 Map of the Byles Creek Study Area



Source: Hornsby Shire Council

3.4 Stakeholder Consultation Outcomes

3.4.1 Overview

In developing the Byles Creek Planning Study, a whole-of-community consultation approach was adopted, in close collaboration with landowners, community interest groups, and the local and broader community. The consultation process, led by Elton Consulting, sought to obtain views and feedback on the key environmental, economic, social and aesthetic attributes of the Byles Creek corridor. The consultation also sought to identify opportunities and barriers with the existing planning controls, opportunities for changes to the planning controls as well as other mechanisms for enhanced protection and management.

To assist with the consultation process, a Discussion Paper was prepared to provide context and preliminary options, along with an online digital survey which provided further opportunity for landowners, community interest groups and the broader community to have their say, along with the ability to provide individual free form submissions. Property owners within the Study Area and nominated Community Interest Groups were invited to participate in 30-minute individual one-on-one online information and feedback sessions with a representative from Elton Consulting.

The consultation was further supported by Frequently Asked Questions (FAQs) to help inform stakeholders on the intent and objectives of the Planning Study. The Discussion Paper, online digital survey and FAQs were accessed via Hornsby Shire Council's 'Have Your Say' webpage.

The community and stakeholder consultation ran from 7th May to the 30th May 2021 inclusive.

The Discussion Paper and associated consultation outcomes helped inform the Byles Creek Planning Study and shape improved environmental outcomes for Byles Creek.

3.4.2 Discussion Paper

A Discussion Paper was prepared by Elton Consulting, in collaboration with Eco Logical Australia (land constraints and opportunities survey) and AEC Group (high-level economic implications analysis) to support the Planning Study and assist the consultation process. This Discussion Paper provided an overview of the project objectives, background and planning control review, land use survey and highlighted key issues and ideas that needed deeper consideration and feedback from the community and stakeholders.

A series of questions intended to stimulate thought and discussion, were embedded throughout the Discussion Paper to help guide discussion through the various consultation platforms, which included an online digital survey and online one-on-one information / feedback sessions for landowners and community interest groups. Refer to **Appendix C** which provides a summary of the consultation outcomes.

The community and other stakeholder inputs have been critical to understanding why the Byles Creek area is such a significant and unique place and what changes they wanted to see to effectively protect the unique environmental characteristics of the corridor.

3.4.3 Summary of outcomes

The outcomes of the consultation across the stakeholder groups indicated general support for the intent and objectives of the Byles Creek Planning Study. The majority of participants indicated that the planning controls were not doing enough to protect Byles Creek and considered that a reduction of development is considered appropriate to mitigate impacts.

The key themes which emerged from the consultation process included:

- Loss of canopy trees, vegetation and habitat;
- Impact of habitat loss on native fauna and corridor functionality;
- Impacts of erosion, weed infestation and increased stormwater run-off; and,

> Visual impact on the bushland setting.

From these themes, some key opportunities to better protect and enhance the environmental qualities of Byles Creek emerged. These include:

> Support for strengthening statutory planning controls through rezoning and increasing minimum lot size in the LEP coupled with enhancement and better enforcement of planning controls in the DCP;

> Support for community education programs and engagement in parallel with implementation of new planning controls; and,

> Acquisition of certain land within the Study Area.

Despite the general support expressed for the intent and objectives of the Planning Study, there were concerns raised by several landowners that the current planning controls are either sufficient or already too rigorous and therefore did not want to see any further restrictions. The divergent views expressed by a smaller proportion of landowners included concerns for:

> Impact of new controls on property values and development potential of their land; and,

> Further restrictions on tree removal for bushfire and asset protection and associated risks to human life and property.

Further details regarding the consultation is provided in the appended Consultation Outcomes Report (**Appendix C**).

3.5 Background

The Byles Creek corridor provides high environmental, scenic, social and heritage value to the local community and Hornsby Shire in general. Because of this value, the corridor has been subject to a number of studies and reviews, including the Byles Creek corridor Environmental Study (and subsequent site specific DCP) and the Byles Creek Land Acquisition Strategy Review (DFP, July 2020). This background is summarised in further detail below.

3.5.1 Byles Creek Corridor Environmental Study, 1995

In October 1995, the Byles Creek corridor Environmental Study investigated approximately 350 hectares of publicly and privately-owned land in Beecroft and identified that the Open Space zoning for the Byles Creek corridor area should be retained due to the high environmental quality, aesthetic and heritage value to the local community and Hornsby Shire.

The Study recommended the following:

» All existing zones as (currently) contained in (the now repealed) Hornsby Shire Local Environmental Plan (LEP) 1994 be retained, i.e. land zoned Open Space A remain Open Space A and not be zoned Environmental Protection B.

» No additional land be rezoned to Open Space A.

» A draft LEP be prepared to amend Hornsby LEP 1994 to designate areas identified as having Vegetation Conservation Significance as "Bushland Protection" (and therefore being subject to the provisions of clause 19 of Hornsby Shire LEP 1994).

» A Plan of Management be prepared in relation to all land zoned Open Space within the catchment.

» Establish a program for acquisition of privately-owned land which is zoned Open Space A.

» Prepare detailed development guidelines for the catchment. In this regard, the Study led to the preparation of the Byles Creek Development Control Plan (DCP) which came into force in May 1998.

At its General Meeting on 1 November 1995, Council resolved to adopt the recommendations of the Byles Creek Environmental Study. As such, for the purposes of this Planning Study, the findings of the Byles Creek

Environmental Study are noted while acknowledging there are some limitations in its application 25 years after preparation and endorsement.

3.5.2 Byles Creek Development Control Plan, 1998

As a result of the Byles Creek corridor Environmental Study, the Byles Creek Development Control Plan (DCP) was prepared in May 1998 with site specific development controls including:

- a minimum setback requirement of 10m from land zoned open space;
- drainage controls requiring on-site detention;
- soil management controls;
- environmental protection, including retention of natural features such as rocky outcrops and significant trees;
- landscape plan requiring 100% locally indigenous species;
- designing buildings to provide protection of any significant trees and minimising earthworks on steep slopes, including pier foundations;
- requirement for Flora and Fauna assessment reports on land zoned, or adjoining land zoned, open space;
- biodiversity friendly fencing along bushland Protection areas;
- bushfire protection measures, including Asset Protection Zones;
- retention of natural watercourses; and,
- parameters for determining sensitive land.

The above provisions have generally been incorporated into the current Hornsby DCP 2013 and applied more broadly across the LGA.

3.5.3 Open Space Review, 2006

In 2006, an Open Space Review (the Review) evaluated all lands in Hornsby Shire in private ownership which were zoned Open Space A (under the now repealed *Hornsby Shire LEP 1994*) to ensure that they met community needs, preserved environmental qualities of the Shire and a financial strategy was in place for the acquisition of privately-owned lands. With respect to land within Byles Creek corridor, the Review recommended the retention of the open space zoning for Byles Creek due to the high environmental, social, aesthetic and heritage values expressed by the community and acknowledged acquisition of privately-owned lots may be required.

3.5.4 Hornsby Development Control Plan, 2013

In October 2013, the Hornsby Development Control Plan 2013 came into effect and applied to all land within the Hornsby Local Government Area, including land to which the Byles Creek DCP previously applied. This resulted in the removal of the site-specific provisions for Byles Creek, with natural environment controls applying more broadly across the LGA.

3.5.5 Byles Creek Land Acquisition Strategy Review, 2020

In August 2020, the Byles Creek Land Acquisition Strategy Review assessed the environmental and social values of Byles Creek corridor in order to review the strategic approach towards land acquisition within the catchment of Byles Creek. Based on the ecological values of the corridor, the Strategy Review concluded that the current extent of the RE1 zoning was appropriate, and no additional land is required to be acquired by Council other than lots already identified, to protect the biodiversity values and ecosystem functionality of the corridor.

Further, the current RE1 zoning was considered sufficient in terms of satisfying the objectives and terrestrial biodiversity provisions of the *Hornsby Local Environmental Plan 2013*.

However, following Council's considerations of the findings of the Strategy Review and significant community comment, Council resolved to progress this review of the suitability of the planning controls for residential properties adjoining open space zoned land within the Byles Creek corridor with regard to protection and maintenance of the environmental values.

3.5.6 Vegetation Mapping Planning Proposal

Hornsby Shire is currently progressing a planning proposal that seeks to update and expand the Terrestrial Biodiversity Map within the *Hornsby Local Environmental Plan 2013* and replace the term "Terrestrial Biodiversity" with "Environmentally Sensitive Land" in Clause 6.4. The objective of the Planning Proposal is to implement Council's policy intent to enhance the protection and management of vegetation by ensuring the appropriate level of consideration and assessment is undertaken for development proposals.

The Planning Proposal is currently being assessed by the NSW Department of Planning, Industry and Environment.

4 Valuing the Byles Creek corridor

4.1 Corridors and connectivity

There is a growing body of research recognising the importance of connecting biodiversity in urban environments. Connectivity has proven to enhance and protect biodiversity in increasingly fragmented and disturbed environments, facilitating movement of native flora and fauna within the landscape.

Research shows connectivity enhances the protected areas by maintaining and enriching species diversity. It also increases resilience to threatening processes such as climate change by allowing movement to alternate areas as climatic conditions impact traditional ranges. Despite the level of habitat fragmentation and disturbance, connectivity has also been seen to benefit biodiversity in urban environments.

The International Union for Conservation of Nature (IUCN) has recognised the value in supporting connectivity to small protected reserves (i.e. those less than 10ha) within highly urbanised environments. Connectivity allows native animals, including birds and insects to travel safely between patches of priority habitat as they forage for food, shelter and find mates, connecting remnant vegetation that would otherwise be entirely separated by human activities and development such as roads, housing and industrial zones. These connections are also important to native plants as they allow for seeds and pollen to be dispersed.

Scattered trees, such as those found on residential land, are also important in enabling movements of many arboreal species between habitats as these species often will not travel along the ground and therefore require suitably spaced trees to enable their movements.

Figure 3 Byles Creek Riparian Corridor

Source: Elton Consulting, 2021

4.2 Biodiversity values in Hornsby Shire

Hornsby Shire possesses significant biodiversity, particularly when compared to other Greater Sydney Metropolitan Local Government Areas. This can be attributed to the diversity of habitats within the LGA, as well as the high percentage of vegetation cover (bushland) within large and protected areas, reserves on lands managed by other agencies (i.e. Transport for NSW) and private properties. This biodiversity is a significant and defining feature of the 'Bushland Shire' and one that requires safeguarding for future generations

Diverse native fauna and flora live and move through urban environments, including endangered and threatened species. Byles Creek is home to many native fauna species, including the Powerful Owl, Gang Gang Cockatoos and the Little Bent-Winged Bat. The Byles Creek Corridor also accommodates the Critically Endangered Ecological Community Blue Gum High Forest, regionally significant Coachwood Rainforest, locally significant Blackbutt Gully Forest within the corridor.

In addition to the requirements for species to move safely and freely between their preferred habitats, many native (and threatened) species require specific habitat resources for sheltering, including nesting and roosting habitats. Specifically, the Byles Creek corridor supports numerous hollow-dependant fauna such as Owls, Glossy Black Cockatoos, Microbats, Possums, all of which utilise tree hollows for shelter sites. As such, for large, mature hollow-bearing trees within the landscape of their home ranges is extremely important and may not always be able to be met by the availability of such resources within public lands alone.

Figure 4 Dense vegetation within the Byles Creek Study Area

Source: Eco Logical Australia, 2021

Reversing the trend of declining biodiversity globally and locally, requires protecting and enhancing biodiversity in urban areas. We also recognise and value the benefits that biodiversity brings to local environments and communities, such as critical ecosystem services and improving community health and well-being. Some of the ecosystem services provided by natural systems include carbon sequestration, air and water filtration, and urban cooling. Wellbeing and community health benefits gained from biodiversity, include spiritual enrichment, cognitive development, recreation and visual amenity.

As we begin to recover from the COVID-19 pandemic, there is a growing market and emerging price premium for urban properties where environmental qualities and biodiversity is well conserved and the related landscape values and amenity it can generate. This is particularly relevant as working from home is becoming the norm and we are spending more time than ever at our place of residence.

4.3 Importance of biodiversity on private land

Private lands form an essential part of Hornsby Shire's overall biodiversity values and there is a significant role of public and private realms in the urban environment in maintaining biodiversity.

As part of assessing Development Applications, Council has responsibilities to protect threatened species and improve overall biodiversity. There are a range of tools to guide Council in DA assessments and provide certainty for landowners and developers when preparing applications. These include zoning for environmental protection and overlays depicting biodiversity or environmentally sensitive land in the local environmental plan to planning controls (guidelines) in the DCP.

The improved effectiveness of ongoing biodiversity management and planning are necessary to ensure that development can occur in a sustainable way. Effective management and planning can enable appropriate development to proceed while preserving a finite and highly valuable environmental resource.

4.4 Heritage significance – Marie Byles

Byles Creek was named after conservationist, mountaineer and avid bushwalker; Marie Beuzeville Byles (8 April 1900 – 21 November 1979). She was also the first practising female solicitor in NSW and founder of the Beecroft Cheltenham Civic Trust.

By 1938 Byles left her family home in Beecroft and built her own house on bushland that she had bought in 1935 at the edge of nearby Cheltenham, adjacent to crown land. She named it 'Ahimsa' after the term used by Gandhi meaning "harmlessness". The four-room simple cottage is built of fibro and sandstone, and the large north-facing verandah is primarily where Byles slept and lived in preference to the interior rooms. In addition to the house, she wanted to have a place on her land for groups to meet for discussions and meditation. By 1949, the 'Hut of Happy Omen' was complete, designed as an open sleepout with bunks and a large sandstone fireplace. She had another small house built next to 'Ahimsa' in 1975, called 'Sentosa' (a Malay language word meaning peace and tranquillity).

Although only 5 ft 2 ins (158 cm) tall and not physically robust, she had great endurance. She loved the grandeur of mountains and climbed Mount Cook in 1928, [1]She stopped from climbing as result of a foot injury which never properly healed, however she remained an enthusiastic bushwalker.

In 1939, she was elected a fellow of the Royal Geographical Society, London. Following, the Executive office in the Sydney Bush Walkers brought her into the Federation of Bushwalking Clubs, of which she was honorary secretary (1943-47). She was the first editor of and a regular contributor to the Bushwalker. The federation established information and search services, campaigned for new national parks and legislation to protect native flora and fauna, and endeavoured to conserve 'primitive' areas. With bushwalking friends, she had helped to secure the reservation in 1932 of 650 acres (263 ha) of bushland as Bouddi Natural (National) Park on Pittwater and long served as a trustee.

Marie Byles died on 21 November 1979 at her Cheltenham home. She had left sworn testimony of her wish to be allowed to die naturally and requested the Cremation Society of Australia to collect her body. Her ashes were scattered at Ahimsa which she left to the State branch of the National Trust of Australia.

An excerpt from The Summit of Her Ambition: the spirited life of Marie Byles, authored by Anne McLeod, is provided as follows;

[2]'The bush is necessary, not only for us who reside near it but for all; it is a breathing place away from the smog of the city, a rare place of peace and quietness necessary for our health. It is essential for the preservation of our unique flora and fauna for present and future generations; but above all it is necessary for nature itself; man cannot live without nature …

Let us keep our bush and value it higher than gold or anything we can mine from the soil. Yes! Even oil. Roads and homes are 'worthy causes' but can be put elsewhere; bush cannot. Therefore let us jealously guard our bush and please do not steal from it.'"

[1] Heather Radi, 'Byles, Marie Beuzeville (1900–1979)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, https://adb.anu.edu.au/biography/byles-marie-beuzeville-9652/text17027, published first in hardcopy 1993, accessed online 27 June 2021.
[2] The Summit of Her Ambition: the spirited life of Marie Byles, Chapter 18, 'The greatest lesson learnt', p. 181 by author Anne McLeod. Accessed online 27 June 2021.

5 Existing Landscape

The following chapter summarises the land use and environmental constraints identified by Eco Logical Australia. Refer to **Appendix A** for the detailed Site Constraints and Opportunities Analysis by Eco Logical Australia.

5.1 Unique characteristics

The Byles Creek corridor provides significant biodiversity values provided through areas of retained native vegetation, including large areas in public reserve systems (i.e. Lane Cove National Park, Berowra Valley National Park and land zoned RE1 – Public Recreation comprising the Byles Creek catchment and core corridor), as well as substantial areas of native vegetation on private land.

Residents and visitors to the area are able to see and hear rare and threatened native species (such as the Powerful Owl), as well as enjoy substantial amenity because of the unique area of undeveloped or partially developed urban forest landscape.

The significant biodiversity values within the Byles Creek Study Area are:

- Critically Endangered Ecological Community Blue Gum High Forest
- Regionally significant Coachwood Rainforest
- Locally significant Blackbutt Gully Forest
- Connectivity to Lane Cove National Park (LCNP)
- Habitat for threatened fauna including Powerful Owl, Gang-Gang Cockatoo, Red-crowned Toadlet, Little Bent-winged Bat and microbats
- Gang-gang Cockatoo endangered population
- Habitat for threatened flora including Brittle Midge Orchid *(Genoplesium bauera),* Deane's Tea-tree *(Leptospermum deanei*), Tetratheca *glandulosa* and *Darwinia biflora.*

5.2 Topography

The topography of the Byles Creek Study Area ranges from flat in mainly residential areas to very steep along ridge lines (**Figure 5**). The public open space zoned land is clearly defined by the topography. The slope gradients in the public open space area are greater compared to residential properties. Steep slopes exceeding 45 degrees around the ridge lines are evident along contours of greatest elevation sloping down towards streamlines. The topography of the Byles Creek open space zoned land is not suitable for urban development due to steep slopes and associated risks.

Some increased risks associated with slope may also apply to residential zoned land surrounding the open space, including greater bushfire, erosional, landslip and flood risk. Furthermore, the steepness of the catchment means that any stormwater runoff from new properties could lead to additional erosion of the banks of the watercourse or contribute additional sediment or pollutants to the catchment.

Figure 5 Slope map

Source: Eco Logical Australia, 2021

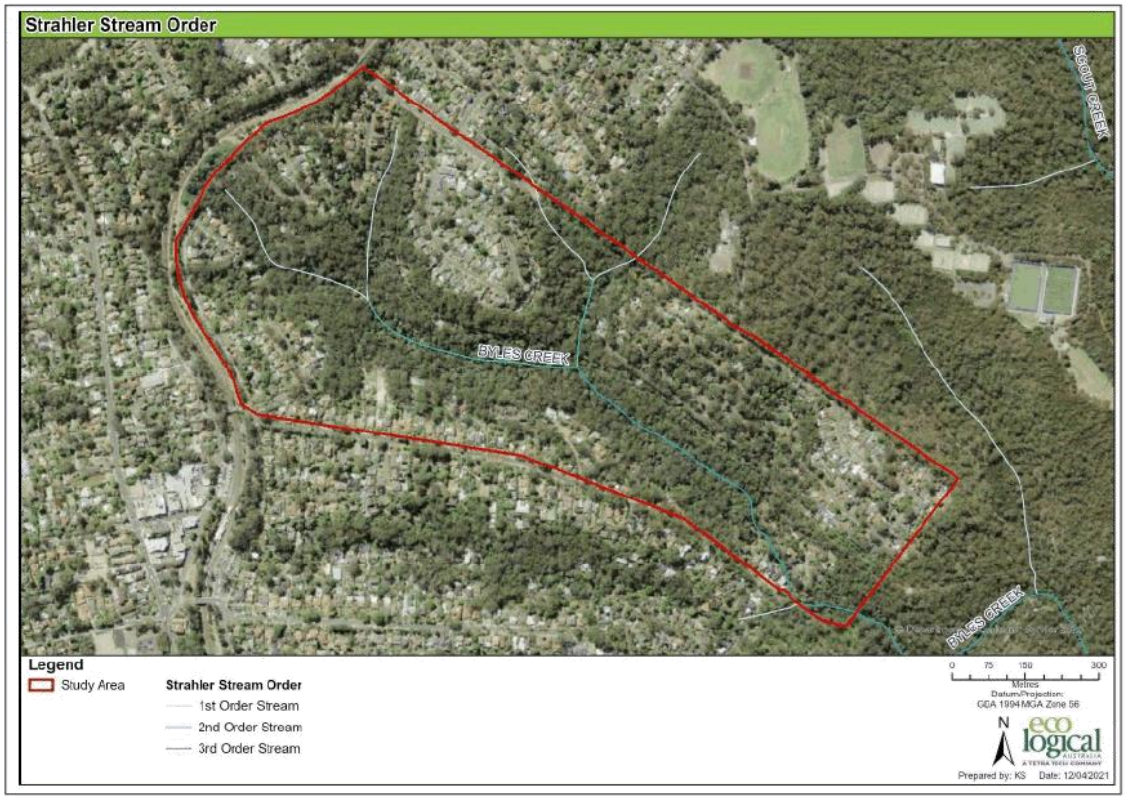
5.3 Watercourses and water quality

Within the Byles Creek Study Area there are seven watercourses that are all tributaries of Byles Creek (**Figure 6**). Four first order, two second order and one third order creeks are accommodated within the Study Area boundary. These watercourses and their riparian zones vary in condition, likely as a result of their position in the catchment.

Overall, Byles Creek and its tributaries are currently in good condition, however the edge effect of urban development alongside lower reaches of Byles Creek is evident. Where properties are in close proximity to the water, the creek is fringed by predominantly exotic species. The riparian vegetation adjacent to the Byles Creek tributary below the eastern end of Azalea Grove is in good condition, although the vegetation along the road edges and property boundaries is in poor condition and dominated by exotic shrubs and vines.

These observations highlight the importance of maintaining a vegetated buffer between residential development and watercourses within Byles Creek catchment. Runoff from new properties could lead to additional erosion and consideration of the quality and quantity of stormwater runoff from new developments is important.

Figure 6 Strahler Stream Order map

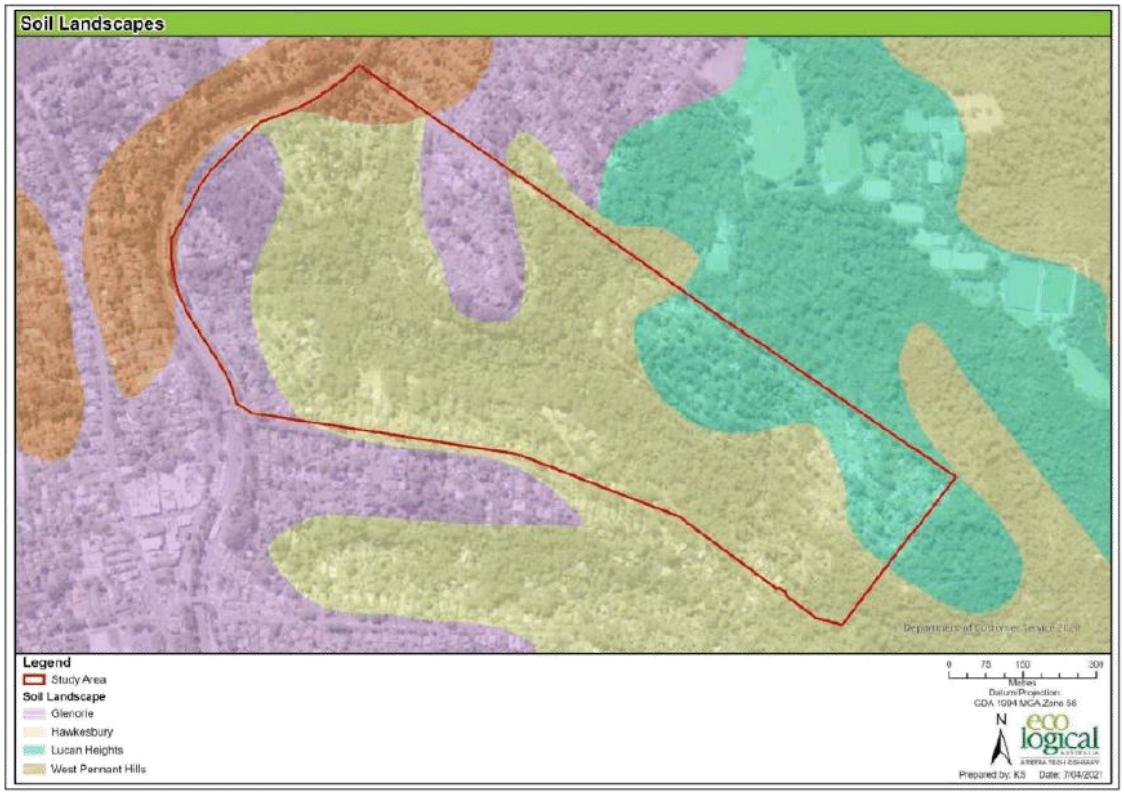


Source: Eco Logical Australia, 2021

5.4 Soil

Findings of the soil landscape analysis undertaken for the Byles Creek Study Area identify that the erosion hazards for non-concentrated flows range from moderate to very high and for concentrated flows from high to extreme (**Figure 7**). This has constraints on future development in regard to stormwater disposal off site, discharged towards Byles Creek and its tributaries, which has the potential to easily erode the slopes leading down to the watercourses at the bottom of the gullies. Erosion of the slopes above the watercourses can lead to sedimentation and degradation of water quality within downstream environments including Lane Cove National Park.

Figure 7 Soil Landscape Map



Source: Eco Logical Australia, 2021

5.5 Ecology - Flora and fauna

5.5.1 Flora

A survey of flora and vegetation communities found three vegetation communities are present within the Byles Creek Study Area. These include:

» **Blue Gum Shale Forest:**

At the north western end of the study area small areas of Blue Gum Shale Forest were present (**Figure 10**). The dominant canopy was *Eucalyptus saligna* (Blue Gum), with occasional *Angophora costata* (Sydney Red Gum) and *Eucalyptus paniculata* (Grey Ironbark). Understorey included small trees *Allocasuarina torulosa* (Forest Oak), with ground layer of *Adiantum aethiopicum, Lomandra longifolia* and *Plectranthus parviflorus*. Some examples of this community were present as remnant trees with little native understorey.

» **Blackbutt Gully Forest:**

The majority of the study area was vegetated by Blackbutt Gully Forest with the dominant canopy species included *Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Smooth-barked Apple), *Syncarpia glomulifera* (Turpentine) and *Corymbia gummifera* (Red Bloodwood). Understorey included shrubs of *Banksia spinulosa, Xanthorrhoea arborea,* and *Persoonia linearis*.

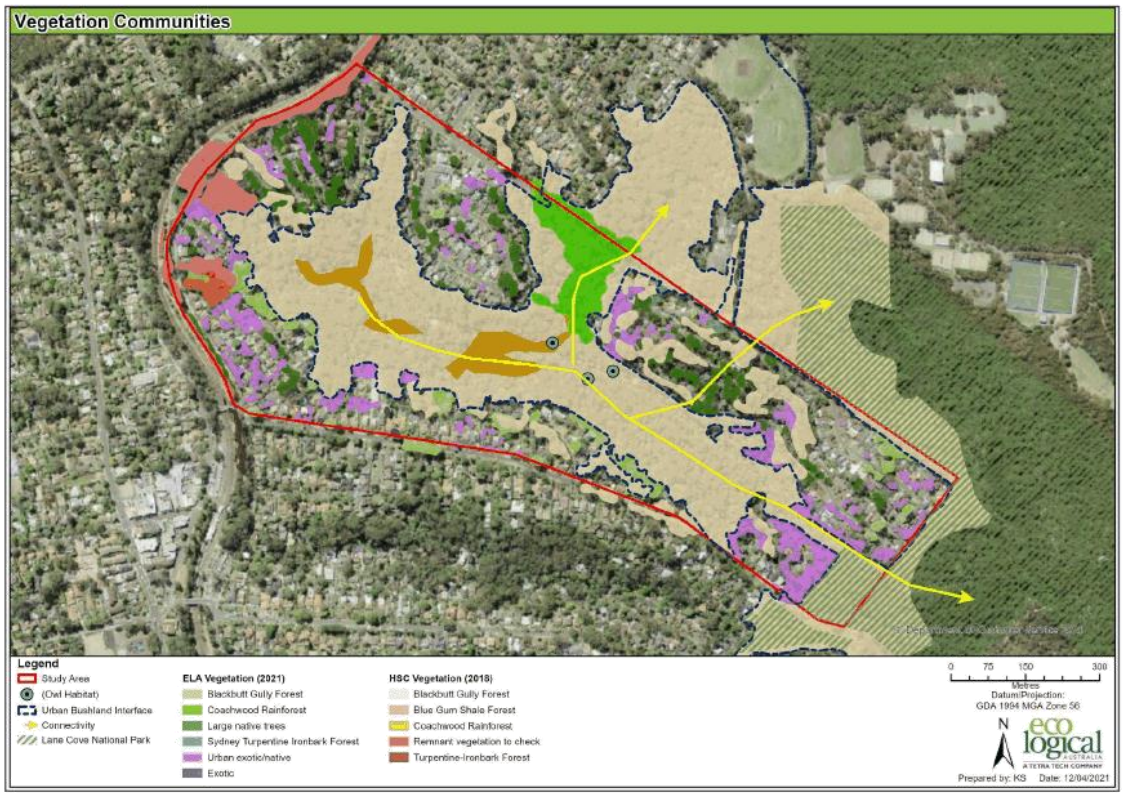
» **Coachwood Rainforest:**

Two areas within the creek line were vegetated by Coachwood Rainforest (**Figure 9**) with dominant canopy of *Ceratopetalum apetalum*. Understorey included small trees of *Tristaniopsis laurina, Callicoma serratifolia,* sedges including *Gahnia clarkei*, ferns such as *Blechnum ambiguum, Sticherus flabellatus*, and vines including *Cissus hypoglauca. Morinda jasminoides* and *Smilax glyciphylla*. Weeds included *Ligustrum sinense* and *Ageratina riparia.*

Remnant tree canopy species were found to be present within front and back yards of private properties and contain both remnant urban trees and plantings.

The interface between the urban and bushland areas and vegetation communities has been mapped as shown in **Figure 8**. The interface is defined by mapping vegetation communities within the bushland area, and mapping remnant trees within the urban area. Whilst most of the bushland is within the public open space, some bushland occurs within privately owned land.

Figure 8: Vegetation communities map



Source: Eco Logical Australia, 2021

The vegetation within the Byles Creek corridor also contains suitable habitat for 30 threatened flora species (identified by BioNet Wildlife Atlas records) within a 5km radius of the study area. There are several records of threatened flora species within or in close proximity to the study area including:

» *Darwinia biflora;*

» *Genoplesium bauera (*Brittle midge orchid)*;*

» *Leptospermum deanei (*Deane's tea-tree)*;* and

» *Tetratheca glandulosa.*

Figure 9 Coachwood Rainforest

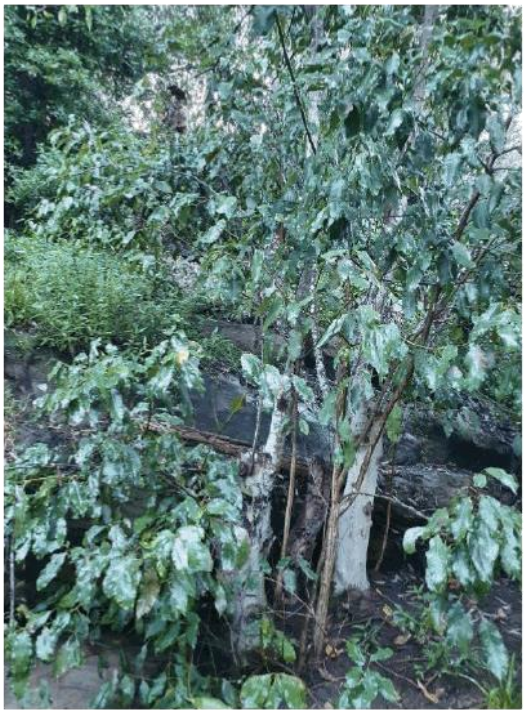


Figure 10 Blue Gum Shale Forest

Source: Eco Logical Australia, 2021

5.5.2 Fauna

There are several rare or threatened bird species including the Glossy Black and the Gang Gang Cockatoos that utilise habitat and feed on trees which occur across the private and public lands within the Byles Creek Study Area. Other rare or endangered birds that occur in the area are Powerful Owls which need wide habitats and tall, hollow bearing trees.

The following fauna species and habitats assessment undertaken by Eco Logical Australia summarises vegetation types found within the study area which provides suitable habitat for a number of common peri-urban species and threatened fauna species.

Table 1 Habitat features and associated groups recorded in the Study Area

Habitat Features	Guild	Presence in the Study Area
Remnant vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	Present and extensive within Byles Creek corridor. Remnant canopy also present within private properties.
Winter flowering species	Winter migratory birds, arboreal mammals and megachiropteran bats (fruit bats)	Limited.
Hollow-bearing trees (HBT)	Birds and arboreal mammals (gliders and microbats)	Present, and ranging in size from small hollows able to support smaller

Habitat Features	Guild	Presence in the Study Area
		species such as microbats to larger hollow dependant species such as owls.
Stags	Birds, particularly birds of prey, reptiles, amphibians, micro bats	Present and likely to provide habitat for larger hollow dependant species such as owls.
Leaf litter	Reptiles, amphibians, invertebrates	Abundant. Deep leaf litter is present across a large portion of the study area within Byles Creek corridor. Limited leaf litter within urban areas.
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Present, logs present within Byles Creek corridor.
Watercourses	Amphibians, reptiles, water birds and microbats	Present – ephemeral streams, 1st 2nd and 3rd order Strahler streams present within study area and is suitable habitat for threatened amphibian species.
Rocks/ rocky outcrops	Reptiles, invertebrates, terrestrial mammals	Abundant – rocky sandstone outcropping and large rocks abundant within Byles Creek corridor.
Vegetative corridor	Birds, reptiles, arboreal and small mammals	Present and extensive within Byles Creek corridor. Remnant canopy also present in front and back of private property. Canopy vegetation contains good connectivity through planted native and exotic canopy species within private property.
Mistletoe	Birds and arboreal mammals	Absent
Native/ Exotic grassland	Migratory wetland birds (Egrets), predator bird species (Little Eagle) and microbats	Limited

Source: Eco Logical Australia, 2021

The Byles Creek corridor contains suitable habitat for 30 threatened flora species within a 5 km radius of the study area. There are several records of threatened fauna species within or near the study area including:

» **Gang-gang Cockatoo (Callocephalon fimbriatum):**

In 2001 the population was listed as endangered by the NSW Scientific Committee which found that the numbers of the Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas have been reduced to such a critical level, and its habitat has been so drastically reduced, that it is in immediate danger of extinction. The small population was the last known breeding population in the Sydney Metropolitan area, estimated at that time to be between 18 - 40 pairs. The species and population are dependent on the retention of potential nest trees which are forest and woodland eucalypts containing hollows.

» **Micro bats:**

The vegetation within the study area is likely to be used as foraging habitat for threatened for microbat species; threatened microbat species may also forage along the streams identified within the study area. Threatened microbat species listed under the BC Act and/or EPBC Act which are likely to forage

within he study area and have been recorded from the BioNet Wildlife Atlas search include; Falsistrellus tasmaniensis (Eastern False Pipistrelle), Micronomus norfolkensis (Eastern Coastal Free-tailed Bat), Miniopterus australis (Little Bent-winged Bat), Myotis macropus (Southern Myotis), Scoteanax rueppellii (Greater Broad-nosed Bat), Miniopterus orianae oceanensis (Large Bent-winged Bat), Chalinolobus dwyeri (Large-eared Pied Bat) and Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat).

» **Powerful Owl (Ninox strenua):**

BioNet records over 1000 sightings of *Ninox strenua* within a 5 km radius of Byles Creek since the 1980s. The species can breed and forage in very small patches of vegetation, although this is hugely variable across their range. Retention of hollow-bearing trees is critically important to the species survival in urban areas and there is competition for urban tree hollows due to their scarcity (i.e. from Sulphur-crested Cockatoos).

» **Koala (Phascolarctos cinereus):**

There are 6 BioNet Wildlife Atlas records for Koala recorded within a 5 km radius of the study area. Koala is listed as a Vulnerable species under the BC Act and EPBC Act. Hornsby local government area is included within the State Environmental Planning Policy (Koala Habitat Protection) 2021.

» **Amphibians**

The study area contains ephemeral streams, 1st 2nd and 3rd order Strahler streams within the study area. Deep leaf litter and rocks are present along the banks of the streams. The streams are suitable habitat for amphibians; including threatened amphibian species listed under the BC Act and/or EPBC Act; *Pseudophryne australis* (Red-crowned Toadlet).

» **Dural Land Snail (Pommerhelix duralensis):**

Dural Land Snail has been recorded within a 5 km radius of the study area. Dural Land Snail favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris (Ridgeway et al., 2014). Dural Land Snail is listed as Endangered under the BC Act and EPBC Act. However, habitat for this species is less likely to be utilised as the habitat has been historically modified for development of residential housing and is disturbed through on-going maintenance through sweeping of leaves, mowing lawns and is less likely to be used as habitat for this species in comparison to the better quality habitat within the study area (i.e. the habitat within the Byles Creek corridor).

5.5.3 Ecological constraints

The above findings on flora and fauna in the Study Area are mapped as ecological constraints on the following map (**Figure 11**). The biodiversity values of these areas, and the impacts on these values, are defined as follows:

» **High ecological values:** This includes all the significant biodiversity values. Direct (removal of vegetation) and indirect impacts to these areas may trigger a likely significant impact under section 7.3 of the BC Act 2016 requiring the preparation of a Biodiversity Development Assessment Report and the concurrence of OEH for approval.

» **Medium ecological values**: This includes the remnant urban trees. Changes to the remnant urban canopy can result in the loss of biodiversity values including their habitat value for urban wildlife, as part of corridor linkages and genetic values.

» **Low ecological values**: This includes the urban developed land and exotic garden as well as disturbed, weedy vegetation. The biodiversity values of the study area would be substantially enhanced with development controls that require the control of priority weeds and promote the use of locally indigenous plant species providing habitat for local fauna species.

Figure 11 Ecological constraints within the Study Area

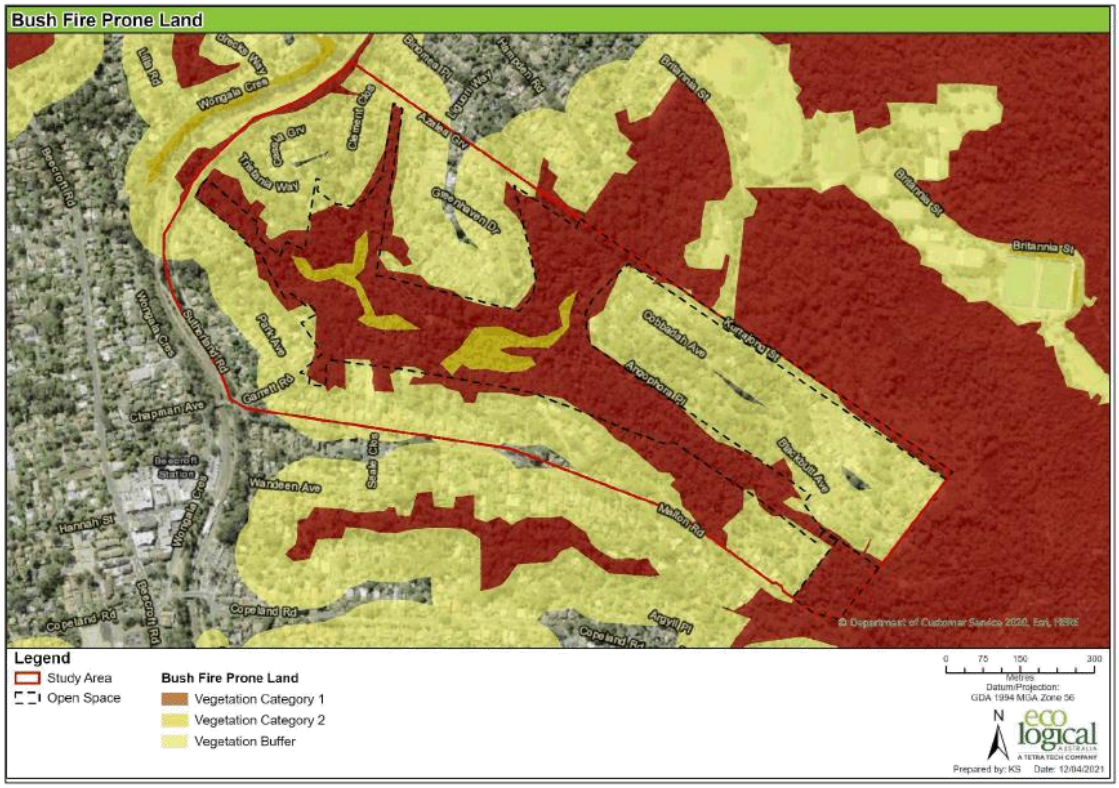
Source: Eco Logical Australia, 2021

5.6 Bushfire

The Byles Creek Study Area is constrained by the presence of bush fire prone vegetation and the resulting requirements of Planning for Bushfire Protection (RFS, 2019), as triggered by the *Environmental Planning and Assessment Act 1979* for development on bushfire prone land.

The core Byles Creek corridor area (RE1 zone) is predominantly mapped as Vegetation Category 1, as shown in **Figure 12**. This is the highest bushfire prone land category and corresponds to the highest bushfire risk, with Category 1 bushfire prone land considered to have the highest likelihood of fully developed fires forming and is subject to a 100m buffer. Much of the residential area surrounding the RE1 zones falls within the bushfire prone vegetation buffer.

Figure 12: Bushfire prone land map



Source: Eco Logical Australia, 2021

The capacity of private land to meet bushfire protection measures is influenced by various constraints including:

» Provision of APZs and the ability of future development to meet setback requirements due to slope and vegetation constraints;

» Access and the ability of future development meeting the requirements of Planning for Bushfire Protection, particularly the provision of perimeter roads; and,

» Water supply and the ability of future development to meet the requirement of Planning for Bushfire Protection.

A high-level review of different development types and their ability to conform with bushfire protection requirements (within the Study Area) has been undertaken and is summarised as follows:

» in fill development: capacity to meet PBP requirements;

» subdivision: capacity to meet PBP requirements are limited due to access and APZ constraints; and,

» Centre-based child care facilities, educational establishments and other Special Fire Protection Purpose Developments (SFPP): capacity to meet PBP requirements unlikely due to SFPP APZ and access requirements.

Figure 13 Existing Bushfire Constraints mapping

Source: Eco Logical Australia, 2021

5.7 Heritage

The Study Area falls within the Beecroft-Cheltenham Heritage Conservation Area, as well as supporting heritage listed properties under Schedule 5 of the Hornsby LEP 2013.

Several items are listed as Environmental Heritage within the study area and shown on the Heritage Map (**Figure 14**) and include Street trees and bushland along Malton Road (I114) and Bushland Reserve adjacent to Sutherland Road and Park Avenue – Byles Creek Valley (I140).

Figure 14 Heritage Map, Hornsby LEP 2013

Source: Hornsby LEP 2013

5.8 Infrastructure

An analysis of infrastructure in the Byles Creek study area was undertaken using a compilation of sources including Dial before you Dig, cadastre data, and shapefiles of Council and Government data (**Figure 15 & Figure 16**).

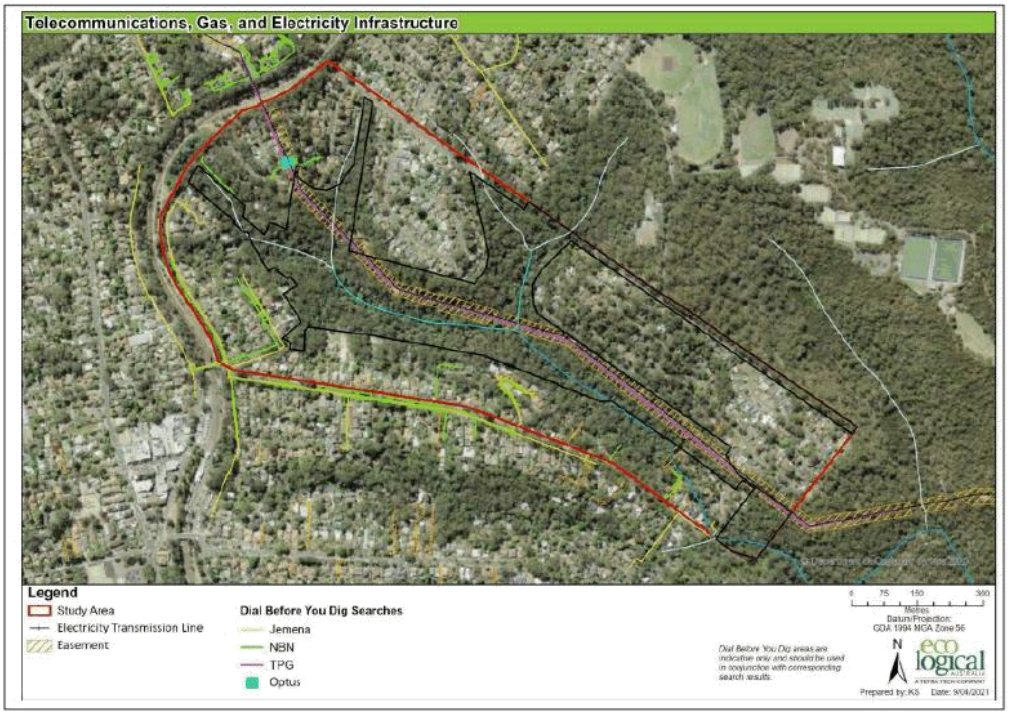
The NBN telecommunications and gas (Jemena) networks are confined to the residential areas within the study area extending mostly along the southern and western edges. The Optus search results showed one point within residential property located in the north west. The telecommunications and gas infrastructure are wholly outside the designated open space area.

TPG infrastructure, the electricity transmission line and easement extend through the study area from the north west residential, transecting bushland along and within the northern Open Space boundary in the central region of the study area until reaching the study area boundary in the south west. TPG infrastructure follows the electricity transmission thus limiting impacts within the Open Space area.

The Sydney Water and council managed water infrastructure is an extensive network throughout the entire study area, however, is less concentrated in the Open Space area. Sewer infrastructure is the predominate water infrastructure type in the Open Space area with some water mains extending from the southern Open Space boundary. Contamination from sewer overflow and leakages is associated risk, overflows can occur from stormwater inflows and during dry periods from chokes, leaks from damaged pipes and damage from tree roots.

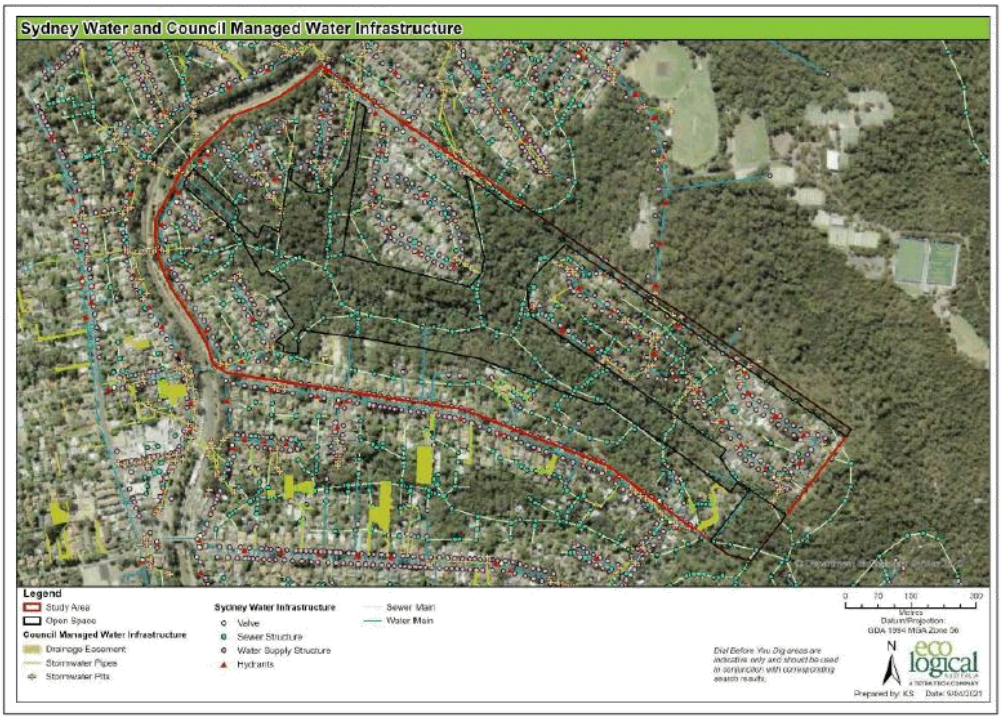
Access to TPG, electricity transmission lines/easement and water infrastructure within the Open Space area is required for maintenance and repair and will need to be maintained.

Figure 15 Infrastructure map



Source: Eco Logical Australia, 2021

Figure 16 Sydney Water and drainage infrastructure



Source: Eco Logical Australia

5.9 Scenic quality

Scenic and cultural landscapes include views to escarpments, ridgetops, bushland, coastal headlands, ocean, harbour, beaches, waterways, and buildings or skylines. They define the landscape character of an area.

Scenic quality is a combination of the natural features that provide the basic pattern of landscape, the cultural elements that are superimposed on this and are more fluid, reflecting social and land use changes over time, and the observer's position within the landscape. Layered on top of this is the perceptual element – the viewer's personal appreciation of landscape and how they relate to or it.

The Byles Creek Study Area provides scenic quality for residents and visitors where:

- Natural features such as the steep topography and vegetated ridgelines accentuates the dense bushland setting interlaced with riparian vegetation and waterways give rise to the physical structure of the landscape, contributing to the visual character and scenic quality of the locality. A significant part of this visual backdrop is accommodated on privately owned land.
- The Study Area falls within a Heritage Conservation Area and a number of properties are heritage listed, thus cultural elements such as historic development and heritage listed trees are prevalent in the Study Area and contribute to the visual character and scenic quality of the area

The visual backdrop of Byles Creek is enjoyed by occupants of properties within the Study area, particularly where there is a direct interface with the Byles Creek corridor, as well as visitors to the area through informal walking tracks.

6 Strategic Policy Framework

State and local policies and strategies provide strong and clear support for protection of environmental values in Hornsby Shire. These include the following documents and their key strategic statements:

- **The Greater Sydney Region Plan** – biodiversity is protected, urban bushland and remnant vegetation is enhanced.
- **North District Plan** – Protect and enhance an interlinked network of open spaces to keep Hornsby Shire cool, encourage healthy living, enhance biodiversity and ecological resilience.
- **Community Strategic Plan** – collaboratively implementing infrastructure, sustainability, liveability, productivity and affordability initiatives to ensure our Bushland Shire thrives now and into the future.
- **Local Strategic Planning Statement** – improve the Shire's waterways, biodiversity corridors, green spaces and tree canopy to support the environment and a healthy community
- **Sustainable Hornsby 2040** – ensure biodiversity is well-managed, resilient and adaptable to land use changes and that we will have a healthy, thriving, diverse and valued urban forest
- **Biodiversity Conservation Strategy** – Protect and conserve ecological values, connect urban habitat and restore disturbed ecosystems to enhance ecological value and function

6.1 Regional policy context

A Metropolis of Three Cities – The Greater Sydney Region Plan & North District Plan

A Metropolis of Three Cities – the Greater Sydney Region Plan (Region Plan) sets a 40-year vision for Greater Sydney. The Region Plan presents a strong case for biodiversity connectivity – incorporating a key direction of 'a city in its landscape'. It identifies a vision for Greater Sydney that protects and manages natural systems, incorporates natural landscape features into the urban environment and cools the urban environment. The Plan informs District and local plans as well as the assessment of planning proposals.

Building on the Region Plan, the North District Plan (District Plan), sets out priorities and actions for the District, which includes the Hornsby Shire LGA. The District Plan builds on 'a city in its landscape' theme, refining it for the local context, identifying key initiatives to deliver the objective: Biodiversity is protected, urban bushland and remnant vegetation is enhanced.

Incorporated within both the Region and District Plan, the Greater Sydney Green Grid is a mapped network of high-quality green space that connects town centres, public transport hubs, and major residential areas. The objectives of the green grid are to protect and enhance an interlinked network of open spaces to keep Hornsby Shire cool, encourage healthy living, enhance biodiversity and ecological resilience.

Strategically, the Region and District Plans have informed the Hornsby Shire's Local Strategic Planning Statement, local environmental plan, local strategies (below), and the assessment of planning proposals (rezoning applications).

6.2 Local Policy Context

Hornsby Shire has pledged to protect and enhance the LGA's bushland environment through its Community Strategic Plan and a raft of supporting documents (**Figure 17**). This includes Council's commitment to protecting and enhancing the Hornsby Shire's natural environment.

Figure 17 Hornsby Shire Council's relevant policy framework

Community Strategic Plan

The Hornsby Shire Community Strategic Plan (CSP) identifies the main priorities and aspirations for the future of Hornsby Shire, acting as Council's long-term plan to deliver the best possible services. It also sets the strategic direction for where the people of Hornsby Shire want to be in 2028.

Through the CSP vision, Council is committed to

*collaboratively implementing infrastructure, **sustainability,** liveability, productivity and affordability initiatives to ensure our Bushland Shire thrives now and into the future."*

As part of the significant consultation program undertaken to develop the CSP, the community indicated that they:

- Love living in the Hornsby Shire because of the natural environment particularly the bushland, national parks, trees and green spaces. However, there are concerns amongst the community regarding infrastructure, roads and development and particularly the changes to the landscape brought about by new developments.
- Would like less development in general and a balance of better planning for developments with protection of the environment, bush and green spaces.

The CSP includes sustainability outcomes which will help protect and enhance local natural surroundings. Indicators of success include:

- Number of threatened plan and animal species;
- The natural environment is well catered for and protected; and,
- Waterways are protected.

Local Strategic Planning Statement

Council has developed the Local Strategic Planning Statement (LSPS) which identifies the long-term vision for the Shire through reviewing and developing local strategies and plans that shape the way Hornsby Shire will change over time. It identifies Hornsby Shire's special characteristics and the values that are to be preserved and how change will be managed into the future.

The LSPS addresses the themes of liveability, sustainability, productivity and collaboration and reflect the key priorities identified by the community.

LSPS has planning priorities for sustainability that reiterate the need to improve the Shire's waterways, biodiversity corridors, green spaces and tree canopy to support the environment and a healthy community.

Sustainable Hornsby 2040

This Strategy provides an overarching framework to achieve an innovative and environmentally sustainable Shire with resilient, diverse and thriving communities and ecosystems.

Council's Environmental Sustainability Strategy – Sustainable Hornsby 2040 is part of the Sustainability theme of the Community Strategic Plan. The draft strategy is the overarching environmental sustainability strategy for Council that draws together several supporting documents, including the draft Biodiversity Conservation Strategy, discussed below.

The Strategy acknowledges the many challenges posed by climate change, population growth and urban intensification and provides a vision for a sustainable future.

The Vision for a Sustainable Hornsby proposed in the draft strategy is:

"Our thinking and decision-making will be long-term, meeting the needs of the present without compromising the ability of future generations to meet their own needs. This means ensuring that ***the ways in which we live, work and play will not adversely affect our environment*** *but offer a more sustainable lifestyle for all members of our community."*

Relevant to the Planning Study, a key theme and goal in the draft strategy is to ensure biodiversity is well-managed, resilient and adaptable to land use changes and that we will have a healthy, thriving, diverse and valued urban forest.

Biodiversity Conservation Strategy

The Hornsby Biodiversity Conservation Strategy focuses upon all lands within the Hornsby Shire LGA. It provides strategic recommendations for the preservation of biodiversity across Hornsby Shire, including privately owned land. The Planning Study will provide recommendations which will help Council achieve the following relevant aims of the Biodiversity Conservation Strategy:

Strategy 1: Protect and conserve ecological values

The protection and conservation of existing remnant ecosystems is crucial to the prevention of further habitat and biodiversity loss and the viability of green infrastructure. Remnant ecosystems such as the Byles Creek corridor provide important habitat resources for urban biodiversity, and community access to natural landscapes. In addition, ecological values across other land-use types including parks, waterways and restored areas will be increasingly recognised for their ecological value.

Strategy 2: Connect urban habitat

Species diversity and genetic health relies on the total area of habitat, proximity of habitats, and the capacity of species to move between habitats. Green infrastructure corridors allow plants and animals to recolonise areas where they have become locally extinct, so they can be enjoyed by future generations and have long-term viability. They also allow species to find alternative habitat in times of major disasters such as fire or flood, and escape major threats such as clearing or disease. It is important to understand the existing network of green and blue habitats and their links. Where links between existing habitats are incomplete, approaches – such as the Green Infrastructure Framework – are needed that help to restore both corridor and stepping-stone habitat connections. Urban green and blue grid corridors and networks can also provide a range of social benefits including improved recreation opportunities and neighbourhood destinations.

Strategy 3: Restore disturbed ecosystems to enhance ecological value and function

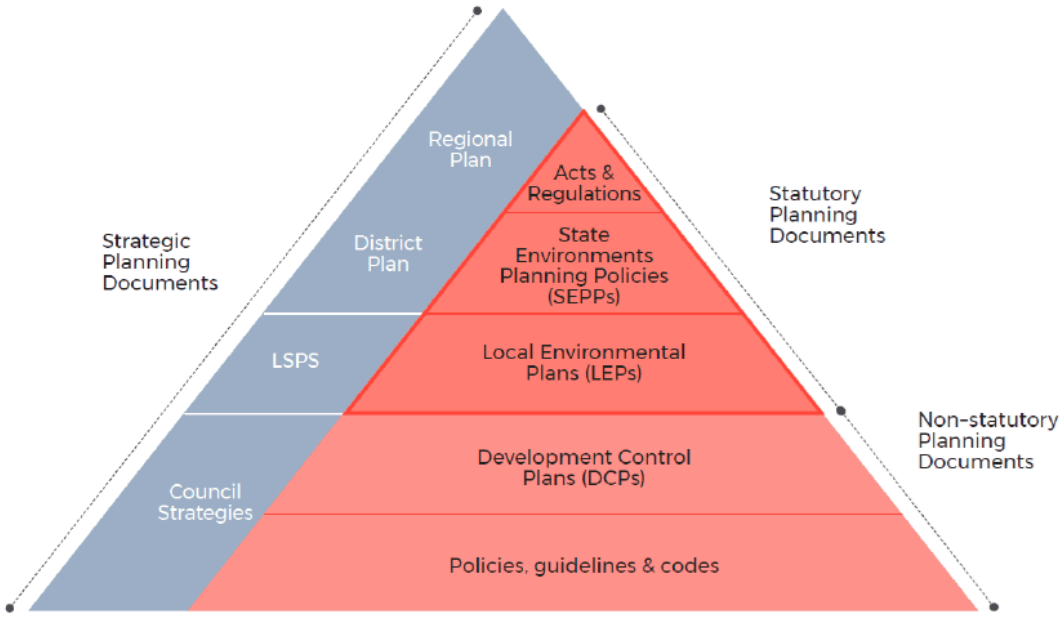
Where ecosystems have been disturbed, restoration is the preferred option to improve habitat structure and function and support biodiversity. Restoration not only includes bush regeneration and weed management in the reserve system, which is statutorily required, but also refers to urban habitat corridors where the built form as well as gardens, street verges, parks, and large institutional properties etc. can all play a role in improving habitat through the way they are designed and managed. Specific actions will vary depending on location; condition; identified values; past, current, and anticipated pressures; and what is feasible and practical.

7 The planning framework

Biodiversity, connectivity and green infrastructure feature strongly in the NSW planning framework – creating a pathway for enhanced protection of our remnant bushland in urban planning. The enhancement, management and protection of the Hornsby Shire's natural environment on public and private land sits within a confluence of strategic and statutory planning, as well as biodiversity policies (discussed in Chapter 6 above).

The policy framework, as well as Hornsby Shire's commitment to managing its bushland, recognises the opportunity to enhance environmental outcomes through private land. **Figure 18** illustrates how Hornsby Shire's planning policies and plans relate to the NSW planning framework hierarchy. The NSW planning framework is summarised below.

Figure 18 NSW Planning Framework



Source: Elton Consulting, 2021

7.1 State planning framework

Environmental Planning and Assessment Act, 1979

The *Environmental Planning and Assessment Act, 1979* (EP&A Act) provides the framework for the NSW planning system. Hornsby Shire's statutory planning power stems from the EP&A Act, which provides the basis for any development assessment in NSW. Objects of the Act include facilitating ecologically sustainable development and biodiversity considerations.

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) dictates the NSW approach to protecting biodiversity, regulating a range of development activities on land, and outlines how the impact of these activities on the natural environment are managed.

State Environmental Planning Policy No 19—Bushland in Urban Areas

State *Environmental Planning Policy No 19—Bushland in Urban Areas* (SEPP 19) applies to bushland within the urban areas identified in Schedule 1 of the SEPP, including Hornsby Shire Council. SEPP 19 will continue to operate separately to the Vegetation SEPP (discussed below) and will prevail over the Vegetation SEPP to the extent of any inconsistency.

SEPP 19 aims to both protect and preserve bushland within urban areas. The Policy provides development control measures on development of land which contains bushland and is zoned Open Space. SEPP 19 also extends beyond the protection of environmental values of bushland. It identifies the need to protect the aesthetic and community values as well as the recreational, educational and scientific values of this resource. It focuses on the protection and management of bushland found on land zoned public open space and includes the minimisation of impacts as a result of development on land adjoining urban bushland.

The policy also applies to land adjoining bushland zoned or reserved for public open space purposes (i.e. land zoned RE1 – Public Recreation). In such instances a public authority, when proposing to either carry out or consent to development on such land, must not do so unless the impact of such development on the bushland has been addressed.

State Environmental Planning Policy - Vegetation in Non-Rural Areas 2017

The *State Environmental Planning Policy - Vegetation in Non-Rural Areas 2017* (Vegetation SEPP) supports a framework for the regulation of native vegetation in NSW. The Vegetation SEPP ensures the biodiversity offset scheme applies to all clearing of native vegetation that exceeds the offset thresholds in urban and environmental conservation zones that do not require development consent.

The Vegetation SEPP works together with the *Biodiversity Conservation Act 2016* to create a framework for the regulation of clearing of native vegetation in NSW.

State Environmental Planning Policy (Koala Habitat Protection) 2021

This policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. The Planning Study seeks to preserve existing significant vegetation and key habitat, thereby achieving the objectives of the SEPP.

Draft Design and Place SEPP

The draft Design and Place SEPP provides guidelines to enable design excellence in new development. The new Design and Place SEPP will also incorporate the principles identified in the Greener Places Framework and Design Guide which guides the planning, design and delivery of green infrastructure in urban areas across NSW.

At the time of reporting, the final Design and Place SEPP is proposed for public exhibition in late 2021.

Draft Greener Places: An Urban Green Infrastructure Design Framework

The draft Greener Places: An Urban Green Infrastructure Design Framework guides the planning, design, and delivery of green infrastructure in urban areas across NSW. Connectivity is one of its principles. This principle supports biodiversity connectivity by focusing on protecting and improving core bushland areas and green corridors as well as improving vegetation and native fauna connectivity.

At the time of reporting, the draft Greener Places Design Guide is on public exhibition, closing on 28 August 2021.

7.2 Review of the local planning framework

Through LEPs and DCPs, councils can integrate environmental protection with the social and economic needs of their local government area. This is made possible by good urban planning and the implementation of

regulatory planning mechanisms; such as appropriate land use zoning, minimum lot sizes or landscaping requirements for new developments.

The Byles Creek study area is subject to the statutory planning provisions of the *Hornsby Local Environmental Plan 2013* (Hornsby LEP 2013), supplemented by detailed planning controls pursuant to the Hornsby Development Control Plan 2013 (Hornsby DCP 2013).

Several Greater Sydney Council's work (Connected Corridors for Biodiversity) have demonstrated there are significant opportunities to incorporate provisions in the LEP and DCP to strengthen biodiversity corridors on private land These opportunities include land use zoning, environmental overlay maps, landscaping and built form controls which manage development. Amendments to LEP and DCP controls would ensure an appropriate level of ecological consideration is incorporated into the development assessment process, maximising the potential for new developments to support habitat features.

7.2.1 Hornsby Local Environmental Plan 2013

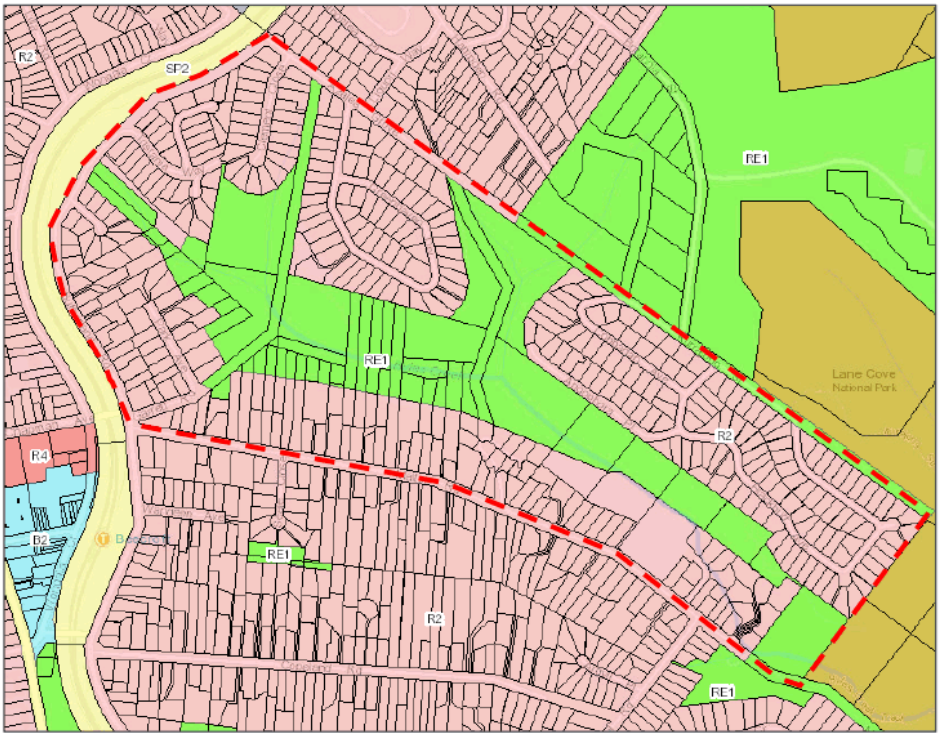
A Local Environmental Plan (LEP) is a statutory planning document that guides planning decisions for local government areas within NSW. They do this through zoning and development controls, which provide a framework for the way land can be used.

The study area is subject to the provisions of the *Hornsby Local Environmental Plan 2013* (Hornsby LEP 2013).

As illustrated in **Figure 19**, the majority of land along the existing Byles Creek corridor is zoned RE1 Public Recreation, with the adjoining sites zoned either R2 – Low Density Residential or part R2 and part RE1.

The R2 – Low Density Residential zone, amongst other uses, permits dwelling houses and other uses that meet the day-to-day needs of residents.

Figure 19 Land use zoning map, Hornsby LEP 2013



Source: Hornsby Council LEP 2013

Other LEP clauses relevant for consideration are summarised in the following table:

Table 2 Review of relevant LEP Clauses

LEP Clause	Description of provision and review
1.2 Aims of the Plan	Provides the overarching planning aims which underpin the LEP and for which new development must not contravene. The Hornsby LEP provides a comprehensive environment specific aim which seeks to enhance and protect the natural environment, including remnant bushland and waterways: *2(h) "to protect and enhance the scenic and biodiversity values of environmentally sensitive land, including bushland, river settlements, river catchments, wetlands and waterways."* **The aims of the plan (LEP) is considered sufficient in terms of providing adequate consideration for environmental values when evaluating the merits of a development application where it encompasses a broad range of environmental, ecological and scenic value considerations.**
4.1 Minimum subdivision lot size	The objectives of this clause are: *a) to provide for the subdivision of land at a density that is appropriate for the site constraints, development potential and infrastructure capacity of the land,* *b) to ensure that lots are of a sufficient size to accommodate development.* The prescribed minimum lot size for the Study Area is 600m^2. **Many of the sites within the Study Area have either already been subdivided or are unable to meet this minimum requirement either by virtue of being too small or due to site constraints such as steep topography. Notwithstanding, there are a small number of sites (~5) which have the potential to be subdivided and which would have a significant impact on vegetation and contribute to increased stormwater runoff and erosion.** **It is also noted that the clause objectives could be improved through terminology of environmental constraints and values.**
5.10 Heritage conservation	The Byles Creek corridor and surrounding land is located within the Beecroft-Cheltenham Heritage Conservation Area, with a number of heritage items located along Malton Road. All development in a Heritage Conservation Area must have consideration for the heritage objectives and requirements within the Clause. Furthermore, the heritage conservation overlay and listings restricts the application of exempt and complying development pursuant to the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.* **Consideration of a heritage listing of specific trees (Significant Tree Register) is an arduous process where trees are to satisfy strict cultural and historic criteria and thus is not recommended as an approach to be pursued as part of this Planning Study.**
6.4 Terrestrial biodiversity	Clause 6.4 of the LEP relates to areas identified as Terrestrial Biodiversity (mapping overlay). The objectives of clause 6.4 of Hornsby LEP 2013 are: *a) protecting native fauna and flora, and* *b) protecting the ecological processes necessary for their continued existence, and*

LEP Clause	Description of provision and review

c) *encouraging the conservation and recovery of native fauna and flora and their habitats.*

A portion of the Byles Creek corridor area is identified as Terrestrial Biodiversity (**Figure 21**). This ensures the catchment area's recognition as an integral part of one the Shire's core bushland areas. Its viability as an intact bushland area is enhanced by its attachment to the larger bushland areas.

It is noted that Council is currently preparing a Planning Proposal to expand Terrestrial Biodiversity Mapping and reclassify as "Environmentally Sensitive Land". Refer to Chapter 3.6.6 for further detail in this regard (Figure 21).

Figure 20 Terrestrial Biodiversity mapping overlay

Source: Hornsby LEP 2013

Figure 21 Proposed vegetation mapping

7.2.2 Hornsby Development Control Plan 2013

The Hornsby Development Control Plan 2013 (Hornsby DCP 2013) provides more detailed planning and design guidelines to supplement the Hornsby LEP 2013. Although non-statutory, the controls within a DCP are matters for considerations under the EP& A Act and must be taken into consideration by Council when assessing a development application. It builds upon the details, objectives and controls in the LEP. It is therefore important that DCPs incorporate biodiversity objectives and controls to mitigate the impacts of development as well as provide opportunities to enhance biodiversity in more urbanised areas.

The development control plan can also ensure an appropriate level of ecological assessment is tied to the development assessment process. This can be achieved through detailed planning controls for specific areas mapped or zoned as having environmental significance, and which provide current or potential future biodiversity corridor linkages.

The Hornsby DCP 2013 includes various detailed prescriptive measures for guiding design of development and enhancing and protecting the Hornsby Shire environment, many of which have been translated from the (now repealed) site specific Byles Creek DCP, including:

» Biodiversity

» Stormwater management

» Watercourses

» Earthworks and slop management and design

» Tree and vegetation preservation

» General Landscaping requirements

» Bushfire

A review of the key relevant sections is summarised in more detail in the sub-sections below.

Biodiversity

Part 1 – General of the Hornsby DCP 2013 provides general controls for the protection of the environment and applies to all forms of development. Section 1C.1.1 of Part 1 relates to biodiversity. This section applies to land with biodiversity value, including land affected by the Hornsby LEP provisions, which includes land identified as having 'Terrestrial Biodiversity value' on the Terrestrial Biodiversity map, accompanying the Hornsby LEP 2013.

The DCP desired outcomes with respect to biodiversity are:

a) *Development that provides for the conservation of biodiversity including threatened species and populations, endangered ecological communities, remnant indigenous trees, regionally and locally significant terrestrial and aquatic vegetation.*

b) *Development that maintains habitat for native wildlife and wildlife corridors to provide for the movement of fauna species.*

These DCP controls support Clause 6.4 – Terrestrial Biodiversity of the Hornsby LEP 2013 which provides statutory provisions associated with the development of land.

The biodiversity provisions in the Hornsby DCP are comprehensive and have been adapted and expanded from the site specific controls which once pertained solely to the Byles Creek area (under the now repealed Byles Creek Development Control Plan, 1998) and are the product of the Byles Creek Corridor Environmental Study undertaken in 1995 (**Chapter 3.6.1**).

Detailed provisions include:

» Prescriptive yet clear measures which require buffer zones to significant vegetation, ranging from 10m-20m, depending on significance (**Table 3**);

» Detailed triggers and requirements for Flora and Fauna Assessment Reports;

- Requirements for minimising fragmentation of existing vegetation;
- Requirements for the retention of natural features such as rock outcrops, wetlands, hollow bearing trees;
- Wildlife friendly fencing for land adjacent to bushland;
- Ensuring landscaping in buffer areas comprises of trees, shrubs, understorey and groundcover species indigenous to the adjoining vegetation community, this helps promote and enhance habitat for native fauna and support biodiversity corridors; and,
- Provisions for riparian areas, including ensuring development is designed and located to maintain an effective watercourse riparian zone comprising native vegetation.

Table 3 Current Buffer zones in the Hornsby DCP 2013

Significant vegetation type	Minimum Buffer Zone
Endangered ecological communities and regionally significant bushland (as mapped in the HLEP Terrestrial Biodiversity Map)	20m
Wetland	20m
Populations of threatened flora species, habitat for threatened species, locally significant bushland, groups of remnant indigenous trees	10m

The appropriateness of the prescriptive provisions in the DCP have been evaluated and are considered appropriate in the context of Byles Creek for providing supplementary controls which seek to retain and enhance vegetation and habitat and protect of the corridor from further fragmentation and habitat loss.

Accordingly, it is considered that stronger LEP controls are required which can be supplement by these detailed design measures in the DCP.

Stormwater Management

Part 1C.1.2 of the Hornsby DCP 2013 provides detailed stormwater management provisions. The DCP desired outcomes for stormwater management include:

a) Development that protects waterways from erosion, pollution and sedimentation, and maintains or improves water quality and aquatic habitats.

b) Water management systems that minimise the effects of flooding and maintains natural environmental flows.

The stormwater provisions of the DCP include prescriptive measures such as:

- Sediment and erosion control during works (including triggers and submission requirements for Erosion and Sediment Control Plans);
- Water hydrology (including on site stormwater management systems and on-site detention requirements and specifications);
- Water quality (including water target thresholds for urban developments).

The water management provisions in the DCP are further supported by Hornsby Shire's Water Sensitive Urban Design (WSUD) Guidelines (2015) which provides detailed guidelines for incorporating WSUD elements into developments.

It is considered that the above prescriptive measures in the DCP and supporting WSUD Guidelines are adequate to ensure appropriate stormwater management and water sensitive urban design is incorporated as part of any future development in the Study Area and the Shire more broadly.

Watercourses

Part 1C.1.3 of the Hornsby DCP 2013 provides requirements for development in vicinity of watercourses (such as creeks and rivers). The desired outcomes of this part of the DCP include:

a) *Watercourses such as creeks and rivers are retained and enhanced to promote the improvement, and protection of the environment.*

b) *Native riparian vegetation areas are retained and enhanced, and degraded riparian areas are rehabilitated.*

The watercourse provisions of the DCP include prescriptive measures such as:

» Bed and ban stability measurers;

» Relevant stormwater measures;

» Retaining flow characteristics of watercourses; and,

» Provisions for riparian areas, including establishment of core riparian zones (CRZ) and vegetated buffers (VB) with a minimum width of 10m.

It is considered that the above prescriptive measures in the DCP could be supported by Riparian Land management requirements in the LEP which would provide regulatory measures to ensure appropriate protection, rehabilitation and enhancement of the existing riparian corridor as part of any future development in the Study Area.

Earthworks and Slope

Hornsby LEP 2013 Clause 6.2 contains provisions for earthworks. The earthworks and slope DCP controls pursuant to Part 1C.1.4 supplement the Hornsby LEP 2013 provisions. The desired outcomes of this part of the DCP are summarised as follows:

a) *Development that is designed to respect the natural landform characteristics and protects the stability of land.*

b) *Development that limits landform modification to maintain the amenity of adjoining properties and streetscape character.*

c) *Earthworks below Mean High Water Mark (MHWM) that avoids, minimises and mitigates the potential for significant environmental harm.*

The earthworks and slope provisions of the DCP are detailed and comprehensive, and include prescriptive measures such as:

» Siting of development on the part of the lot with the least topographical constraints;

» Minimising cut and fill, particularly in environmentally sensitive environments;

» Geotechnical certification requirements for sloping sites in excess of 20%; and,

» Dredging and reclamation of land below the mean high-water mark.

It is considered that the prescriptive measures are adequate and commensurate to the topographical and soil constraints of the Study Area.

Tree Preservation

Section 1B.6 'Tree and Vegetation Preservation' and Section 1B.6.2 'Vegetation Preservation' of the DCP contain provisions concerning tree and vegetation protection. Trees are afforded protection in accordance with the Vegetation in Non-Rural Areas SEPP (discussed under **Part 7.1** of the Planning Study) and where trees are heritage listed through Clause 5.10 (Heritage Conservation) of the Hornsby LEP, except for trees on the exempt tree species list.

No trees of significance are identified within Council's exempt tree species list, therefore ensuring a development application or tree removal application would be required to consider the protection of trees against Council's DCP.

The removal of, or work to, trees should be consistent with the applicable provisions of the Vegetation SEPP, Hornsby LEP and Hornsby DCP.

The tree preservation provisions are comprehensive and provide detailed prescriptive measures including:

- Details of prescribed trees protected under the Vegetation SEPP and Clause 5.10 (Heritage Conservation) of the Hornsby LEP 2013;
- List of exempt species;
- Exempt tree work (including dead trees which do not provide habitat for native fauna – i.e. hollow bearing);
- Detailed requirements for lodging an application for tree work (i.e. DA vs Tree Permit and supporting documentation required such as an Arborist Report);
- Considerations for assessment of tree work, including offsets for any tree approved to be removed to be replaced with like for like indigenous planting in accordance with Council's Green Offsets Code; and,
- Thresholds for the Biodiversity Offsets Scheme, including lots of less than 1ha triggered by 0.25 ha of clearing (Pursuant to the *Biodiversity Conservation Regulation 2017*).

It is considered that the prescriptive measures are adequate in ensuring the protection and offsetting of native trees and vegetation within the Study Area.

It is also noted that trees and vegetation are managed by controls outlined in the Vegetation SEPP and the NSW Rural Fire Services 10/50 Vegetation Clearing Scheme.

8 Best practice case studies

In defining and developing a strategic approach to biodiversity connectivity, Hornsby Shire is keen to understand best practice and other leading local examples. This chapter includes a selection of case studies that represent `best practice' for preservation and enhancement of natural environments in an urban context.

Although every LGA and urban area is a unique combination of social and ecological features there are numerous learnings that have been considered for this project.

The following case studies demonstrate the variety of actions employed to enhance urban biodiversity and improve habitat connectivity in highly urbanised settings. Most of these case studies reflect strategic city-level planning that encompass policy level initiatives and guidance and that have already been implemented. Case studies were selected based on including private land as key habitat as well as on using legislative and policy framework mechanisms to achieve environmental outcomes.

8.1 Local case studies

Local governments in Greater Sydney are employing a range of statutory and non-statutory mechanisms to improve environmental outcomes within their LGAs. Three examples are shared below:

Sutherland Shire Council

Sutherland Shire Council uses regulatory mechanisms to ensure the protection and appropriate management of bushland on private land. These include instruments under the *Sutherland Local Environmental Plan 2015* such as environmentally sensitive residential zoning including E4 – Environmental Living, for areas identified as having special environmental or scenic values and where residential development can be accommodated (**Figure 22**).

These E4 zones are generally located along the fringes of core bushland areas within the Shire (i.e. adjacent to E1, E2 or E4 zones) or along coastal fringes or areas of steep topography and or bushfire constraints. The land is generally residential in nature however provides a supporting vegetation to adjacent bushland and corridor areas, as well as providing scenic protection value. E3 zones are reserved for significantly larger lots where residential development is secondary to the significant native vegetation which occur within these lots.

The Floor Space Ratios applied to E zones within the LEP range from 0.5:1 to 0.55:1.

Similar to Hornsby Shire, Sutherland Shire generally only map significant core vegetation as Terrestrial Biodiversity in the LEP with some minor exceptions in discrete areas.

It also provides mapping for Green Web Bushland Protection areas as part of the DCP, with specific controls dependant on the hierarchy of the environmental value of the corridor (i.e. core, supporting and restoration corridors) which operates on both private and public lands (**Figure 23)**.

The Greenweb initiative identifies priority areas of bushland habitat within the LGA and establishes corridors between them to facilitate the movement of flora and fauna.

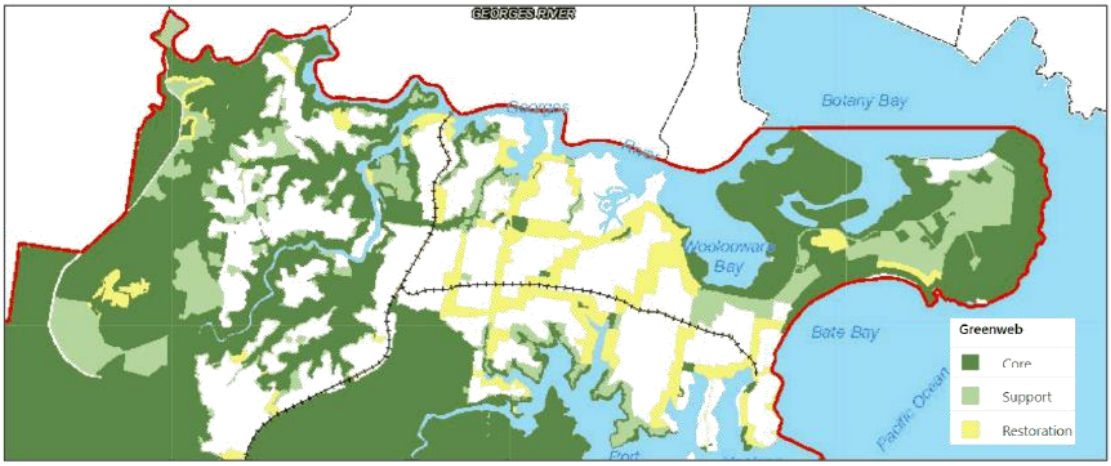
As part of the initiative, Council offers inspections and cost-free gardening consultation for landholders identified within the Greenweb, as well as Greenweb grants.

Resources provided online via Councils website include native plant selectors, information on nature wildlife and recourses for Bushcare volunteers

Figure 22 Use of E zones in the Sutherland LEP

Source: ePlanning, DPIE

Figure 23 Sutherland Shire Council's Greenweb map



Source: ePlanning, DPIE

Ku-ring-gai Council

Ku-ring-gai Council incorporates biodiversity corridors into the LEP mapping, including across private lands; to protect and enhance connectivity. Traditionally, this mapping is limited to discreet habitat areas.

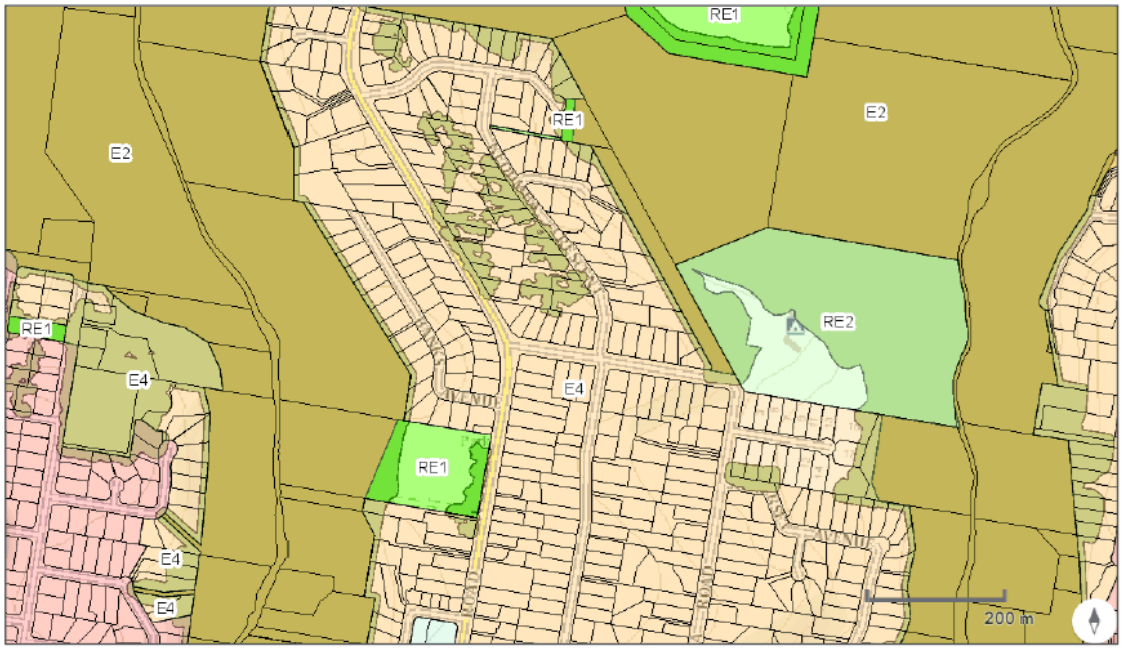
Similar to Sutherland Shire, Ku-ring-gai Council has zoned fringing residential areas within the LGA E4 - Environmental Living (**Figure 24**).

Ku-ring-gai Council has also adopted a comprehensive Biodiversity and Riparian Lands Study, which includes a number of planning recommendations such as inclusion of environmental zoning, map overlays, increasing minimum lot sizes and reducing floor space ratios to manage the impacts of development on the natural environment, in a similar context to Hornsby Shire.

Many of these recommendations have been implemented into the LEP and DCP, including Riparian Lands and Biodiversity Protection mapping in the LEP and comprehensive 'Greenweb' mapping and controls for various categories of biodiversity corridor (i.e. core, supporting and remnant) in the DCP, on both private and public lands.

Ku-ring-gai's education programs includes education, engagement and citizen science projects.

Figure 24 Use of E zones in Ku-ring-gai LEP 2015

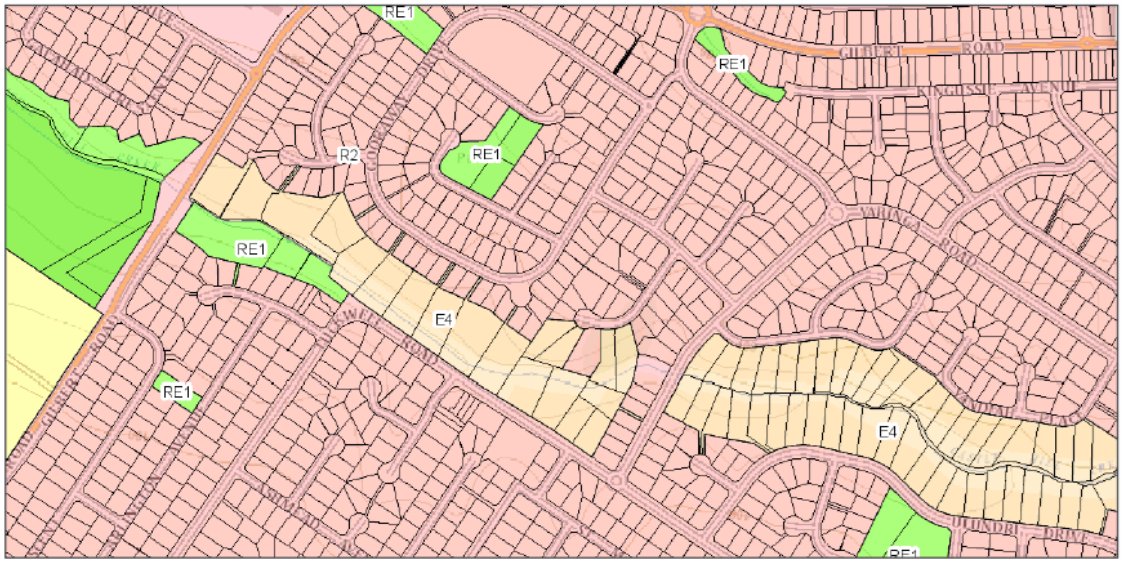


The Hills Shire

The Hills Shire has zoned land surrounding biodiversity corridors (which are zoned RE1 Public Recreation) E4 – Environmental Living (**Figure 25**). The E4 Environmental Living zone in the Hills Shire is used to retain natural drainage channels, protect vegetation, views and topographical features and to reduce the risk of geotechnical hazards. The topographical features and location on a prominent ridgeline further strengthen the need to retain the Environmental Living corridor and preserve the scenic quality of the area and its identified special environmental characteristics and constraints.

The areas which have been rezoned in the Hills Shire reflect similar characteristics to that of the Byles Creek Study area, were they include a combination of significant native vegetation, bushfire prone land, ridgelines as well as scenic and environmental qualities.

Figure 25 E4 zoning in the Hills LEP



Camden Council

Camden Council has identified areas of land within the Camden LGA as being environmentally sensitive and incorporated this mapping overlay into the Camden DCP 2019. Land may be considered environmentally sensitive for a variety of reasons, including the presence of endemic and protected ecological communities or populations, its location as a link between larger bushland remnants, or its location adjacent to watercourses or other significant natural features. The Environmentally Sensitive Land map on Council's website illustrates the likely location of environmentally sensitive land within Camden LGA.

A development application lodged for land shown on the Environmentally Sensitive Land (ESL) Map as being affected by any of the categories identified in the legend must be accompanied by information that adequately addresses a number of matters and includes specific controls for protection and enhancement of the land.

Camden is also seeking to introduce ESL mapping for terrestrial biodiversity and watercourses and riparian land, as well as introduce two new clauses under Part 7 Additional Local Provisions for ESL. These clauses outline what must be considered when Council is assessing applications. The new clauses require proposed development to avoid, minimise, mitigate and offset impacts to terrestrial biodiversity, watercourses and riparian lands.

Northern Beaches Council

Northern Beaches Council, specifically, the *Warringah Local Environmental Plan 2011* (former Warringah Council), includes a Minimum Lot Size clause (Clause 4.1) which provides comprehensive objectives to ensure protection of any environmental values of the land. The clause reads as follows:

a) to protect residential character by providing for the subdivision of land that results in lots that are consistent with the pattern, size and configuration of existing lots in the locality,

b) to promote a subdivision pattern that results in lots that are suitable for commercial and industrial development,

c) to protect the integrity of land holding patterns in rural localities against fragmentation,

d) to achieve low intensity of land use in localities of environmental significance,

e) to provide for appropriate bush fire protection measures on land that has an interface to bushland,

f) to protect and enhance existing remnant bushland,

g) to retain and protect existing significant natural landscape features,

h) to manage biodiversity,

i) to provide for appropriate stormwater management and sewer infrastructure.

8.2 National Case Study

Melbourne City

Endorsed in 2017, the City of Melbourne's Nature in the City Strategy aims to 'create and maintain healthy ecosystems and thriving biodiversity within the city'. Key priorities of this strategy are to improve ecological connectivity in Melbourne City and increase the contribution of private landownership to its biodiversity conservation and ecosystem health. While this project is underway, several key initiatives still to be delivered.

Increasing private landowners' contribution to enhancing Melbourne city's biodiversity and ecosystem health is another priority of this Strategy. Actions developed under this priority include creating a model for effective landholder engagement and undertaking research to understand the barriers to enhancing urban habitat across different building types, uses and tenure arrangements.

Stakeholder engagement was a key aspect of the Strategy to encourage landowner participation. Actions focused on private land include creating a model for effective private landowner engagement through various approaches and further on barriers to enhancing urban nature across existing estates and new developments in the residential, commercial and industrial sectors.

8.3 Key considerations for Hornsby Shire

It is acknowledged that Hornsby Shire Council already employs some of these considerations identified in the case studies. Delivered in LGAs with similar landscapes to Hornsby Shire, the initiatives in the case studies presented highlight further opportunities to use planning controls (i.e. LEP, supplemented by controls in the DCP) to deliver environmental outcomes on private land. They also highlight that other mechanisms, like incentives and raising community awareness, which are fundamental to ensuring community 'buy in' and required to support regulatory tools.

As more Councils look to enhance biodiversity and natural environments in an urban context, principles and considerations have emerged that should inform Hornsby Shire's approach. The range of approaches employed in the case studies highlight that there is no one approach to enhancing and protecting the urban bushland environment.

Key considerations for Hornsby Shire include:

» Regulatory measures such as consideration of environmental zones, minimum lot size objectives and specific development controls for the Byles Creek corridors and areas adjacent/nearby to defined corridors to support connectivity. Design guidelines and considerations provide clear examples for implementation on private land and support engagement with landowners (Sutherland, Ku-ring-gai and Northern Beaches Councils);

» Use of environmental mapping overlays can help guide development to avoid, minimise, mitigate and offset impacts to terrestrial biodiversity, watercourses and riparian lands (Camden Council);

» Priority (native flora and fauna) species should be identified, based on existing inventories, local, state or national policies, research. Whilst it need not include all species known to occur within a city it does need to be representative of known ecological and cultural values (Melbourne City Council);

- Understanding species movement is a key factor in developing the framework for corridor design and establishing functional connectivity. For many jurisdictions, priority species are selected largely based on their dispersal patterns and habitat requirements (Melbourne City Council);
- Stakeholder consultation and engagement is important to encourage support by private landowners for ecological measures as well as informs the barriers across development types, uses and tenures (Melbourne City Council); and,
- Incentives or subsidies for land management activities (e.g. weed management, regeneration, habitat creation) should be used to complement regulatory measures. The range of policy tools available can be targeted to support landowners implementing and maintaining biodiversity on their property (Sutherland and Ku-ring-gai Councils).

9 The current situation

As private land surrounding the Byles Creek corridor area has been modified and developed over the years, there has been a gradual erosion of the corridor and decline of biodiversity and ecosystem functionality.

A development's ecological footprint, even for single residential dwellings, can contribute significantly to biodiversity loss. Increased development and density (largely through subdivisions), has incrementally resulted in canopy tree and understorey loss, increased stormwater runoff, erosion and presence of invasive species.

This means that protecting, maintaining and restoring the natural features of the Byles Creek corridor is of critical importance to the health and wellbeing of local residents, workers and visitors as well as the native flora and fauna which inhabit or travel through the area. We must consider how we develop in the future so that we create a healthy and liveable urban form whilst preserving and enhancing the ecological value of the Byles Creek corridor, especially as we contend with the challenges of climate change.

9.1 Fragmentation of Byles Creek corridor and removal of significant vegetation

Despite the current biodiversity, tree protection and other environmental planning controls in the Hornsby Development Control Plan 2013, we are continuing to see the loss of canopy trees and understorey vegetation, increased stormwater runoff, erosion, weed invasion and habitat loss as result of increased development within the Byles Creek Study area.

Many R2 Low Density Residential zoned sites which immediately adjoin land zoned RE1 Public Recreation within the Byles Creek corridor are heavily vegetated with natural bushland forest, including mature canopy tree cover comprising Blackbutt Gully Forest which corresponds to the Smooth-barked Apple-Turpentine-Blackbutt tall open forest community. These communities are not listed as a threatened ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act), however, are identified as having local significance. This means that a merit assessment of impact is required when assessing a Development Application (DA) which seeks to remove these trees, which have no protection under Commonwealth and State legislation. Many of these trees are estimated to be over 100 years old and with some likely to be over 200 years old.

Many of the properties mapped as having terrestrial biodiversity value have already been developed or have valid approvals for development including subdivision and new dwellings.

The reasons for seeking tree removal as part of various DAs submitted in the area include:

- Subdivision – trees which are either close to or in an indicative dwelling or to be removed to accommodate the proposed access handle for the proposed lots;
- Bushfire protection – extension of existing or new dwellings may require clearing to accommodate Assets Protection Zones (APZs) in accordance with Planning for Bushfire Protection requirements enforced by the Rural Fire Service; and,
- New development or alterations and additions – trees which are within or in vicinity to the building footprint of new or altered developments.

An exacerbating factor in regard to the impacts from the loss of old growth hollow-bearing trees is the time taken for the loss of such features to be replaced. Hollows in trees can often take more than 100 years to develop, whereas the larger hollows in very old and large trees can often take up to 200 years or more to develop (DECC 2007). As such, when these habitat resources are lost, they will not be replaced naturally within the lifespan of any of the species that use them, such as the Powerful Owl.

Landscaping associated with new developments often include grass and exotics in replacement of native trees, understorey and ground cover which do not contribute to habitat, food sources or corridor connectivity.

9.2 Indirect impacts

- Increased abundance of weeds and weed invasion into the core corridor area. This can be brought about by garden escapees that are invasive in areas (i.e. Agapanthus). Inappropriate application of fertilisers can also lead to decreased health of native pastures whilst artificially promoting growth in other non-native species;
- Increased runoff and erosion through increased development close to the Byles Creek Corridor land (i.e. land zoned RE1 Public Recreation);
- Extension of clearing and/or modification of bushland (especially woodlands and forests) for bushfire protection associated with new development. This has led to a loss of food resources for many species, particularly many flowering shrubs and small trees species, as well as a loss of cover required for shelter. Clearing has also resulted in the loss of hollow-bearing trees;
- Removal of rocks, fallen or hollow bearing trees and logs and other natural habitat features. These activities are often undertaken to make land management easier, but these features all provide important habitat for native species such as lizards, frogs and fish; and,
- Increased predation and disruption from domestic animals (cats and dogs).

10 Evaluation of the opportunities

A balance needs to be achieved between allowing residential development to continue while protecting important environmental values of the Byles Creek corridor.

Focussing on developing an urban form that is sensitive to nature is critical. If we reverse the way we currently trade off nature as we develop on and move towards nature sensitive urban planning and design we can begin to maximise and harness the power of nature in the shire to respond to these challenges and create a more liveable urban fabric.

Based on a review of:

» Existing situation – policies, studies and analysis of best practice case studies to develop an evidence base; and,

» Land use survey – environmental constraints and opportunities mapping and analysis of various attributes pertaining the site study area review of best practice case studies, evaluation of council's current local planning framework, and opportunities and constraints analysis,

the following potential opportunities are identified for consideration to enhance and protect the Byles Creek natural environment, to implemented through the local planning framework as part of future development.

10.1 Hornsby LEP 2013

10.1.1 Environmental zoning

It has been raised in the stakeholder consultation that the planning controls need to be strengthened to help enhance and protect the environmental values of Byles Creek. As demonstrated in the case studies, many councils utilise Environmental zones (E zones) to better regulate protection of land with environmental, scenic values or were there are significant site constraints which limit development.

The consent authority (such as Council) must have regard to the objectives for development in a zone when determining a DA in respect of land within the zone, as well as permissibility of the development. Accordingly, it is important that land which provides special or unique environmental or scenic values is zoned appropriately, so that suitable weight can be given to a DA which results in impacts on these aspects.

The standard instrument for principal local environmental plans (LEPs) contains four environment protection zones specifically for land where the primary focus is the conservation and/or management of environmental values.

The Hornsby LEP 2013 currently includes the full suite of environmental protection zones which are adopted for various areas, including:

» E1 National Parks and Reserves (including Lane Cove National Park to the east of the Byles Creek corridor)

» E2 Environmental Conservation (including Calabash and Bradleys Bay)

» E3 Environmental Management (including land adjacent to Berowra Valley National Park and Dural Nature Reserve)

» E4 Environmental Living (including Dangar Island).

As indicated in the best practice case studies, a number of comparable Council's use Environmental zones in their LEPs, including:

» Northern Beaches Council

» Sutherland Shire Council

» Ku-ring-gai Council

» The Hills Council.

Guidelines for the use of E zoning

The Department of Planning, Industry and Environment's Practice Note (PN09-002), indicates that the criteria for applying environmental zones.

DPIE sets the following constraints on the **use of E2 and E3 zones**:

» Limit use of E2 and E3 zoning to validated areas of:

> Rainforest;

> Old growth forest;

> Rare, endangered or vulnerable vegetation as identified by the Janis Committee criteria; and

> Native vegetation on hazard lands such as lands prone to slip and bushfire.

DPIE sets the following guidelines on the use of the **E4 – Environmental Living zoning**:

» Typically applied to existing low impact residential development;

» May include areas already zoned for residential that have special environmental values; and

» Where environmental impacts as result of new development are the primary concern.

Zones E2 to E4 will generally need to be supplemented by detailed provisions in the development control plan. These would most likely cover the design, construction and management of uses in these zones, particularly with respect to dwellings (as well as other land uses such as eco-tourism, tourist accommodation etc).

Comparison of E zones and the current R2 zone

A comparison summary of the objectives and permissible development within these land use zones is provided in the following table.

Table 4 Residential and environmental land use comparison summary

Land use zone & purpose	Zone objectives	Key permissible uses	Prohibited uses
R2 – Low density residential (current zoning) This zone is intended to be applied to land where primarily low-density housing is to be established or maintained. Typically, the zone features detached dwelling houses. This is the lowest density urban residential zone and the most restrictive in terms of other permitted uses considered suitable. These are generally restricted to facilities or services that meet the day-to-day needs of residents.	» To provide for the housing needs of the community within a low-density residential environment. » To enable other land uses that provide facilities or services to meet the day to day needs of residents.	Boarding houses; Centre-based child care facilities; Community facilities; **Dwelling houses*;** Educational establishments; Flood mitigation works; Group homes; Home-based child care; Home businesses; Information and education facilities; Places of public worship; Public administration buildings; Recreation areas; Recreation facilities (outdoor); Respite day care centres; Roads; Tourist and visitor	Any other development not specified as permissible.

Land use zone & purpose	Zone objectives	Key permissible uses	Prohibited uses
		accommodation; Veterinary hospitals.	
E1 – National Parks & Nature Reserves This zone is for existing national parks, nature reserves and conservation areas and new areas proposed for reservation that have been identified and agreed by the NSW Government.	» To enable the management and appropriate use of land that is reserved under the *National Parks and Wildlife Act 1974* or that is acquired under Part 11 of that Act. » To enable uses authorised under the *National Parks and Wildlife Act 1974.* » To identify land that is to be reserved under the *National Parks and Wildlife Act 1974* and to protect the environmental significance of that land.	Generally, only uses authorised under the *National Parks and Wildlife Act 1974* are permitted in the E1 zone (without consent).	No development is permitted with consent.
E2 Environmental Conservation This zone is for areas with high ecological, scientific, cultural or aesthetic values outside national parks and nature reserves. The zone provides the highest level of protection, management and restoration for such lands whilst allowing uses compatible with those values.	» To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. » To prevent development that could destroy, damage or otherwise have an adverse effect on those values. » To maintain and improve water quality in the Hawkesbury River.	Environmental facilities; Environmental protection works; Flood mitigation works; Jetties Oyster aquaculture.	Any other development not specified as permissible
E3 Environmental Management This zone is for land where there are special ecological, scientific, cultural or aesthetic attributes or environmental hazards/processes that require careful consideration/management and for uses compatible with these values.	» To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values. » To provide for a limited range of development that does not have an adverse effect on those values.	**Dwelling houses***; Environmental facilities; Farm buildings; Flood mitigation works; Group homes; Home-based child care; Recreation areas; Recreation facilities (outdoor); Roads; Tank-based aquaculture; Tourist	Any other development not specified as permissible.

Land use zone & purpose	Zone objectives	Key permissible uses	Prohibited uses
	» To protect the natural environment of steep lands and floodplains within the catchment of the Hawkesbury River.	and visitor accommodation	
E4 Environmental Living This zone is for land with special environmental or scenic values and accommodates low impact residential development. As with the E3 zone, any development is to be well located and designed so that it does not have an adverse effect on the environmental qualities of the land.	» To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values. » To ensure that residential development does not have an adverse effect on those values. » To permit development that is compatible with the character, infrastructure capacity and access limitations of the area.	**Dwelling houses*;** Group homes; Home-based child care; Roads; Tank-based aquaculture; Tourist and visitor accommodation	Any other development not specified as permissible.

***Note** – *Dwelling House* in the LEP means: *a building containing only one dwelling*. Also refer to the Dictionary within the Hornsby LEP 2013 for definitions of other key land uses specified in the table above.

Accordingly, consideration of an appropriate Environmental zone may ensure optimal land use outcomes that are both environmentally sustainable and facilitate development. As the E1 and E2 zones prohibit residential development and are reserved for either National Parks (E1) or areas of significant ecological value (E2), these options have not been put forward for further investigation as part of the Planning Study.

Selection of E3 or E4 zoning:

The majority of residential zoned land within the Study Area (particularly those with direct interface to land zoned RE1) provides a combination of ecological values, significant bushfire risk and topographical constraints which warrants an environmentally focussed set of zoning objectives and land uses.

In accordance with the DPIE's Practice Note, when determining whether an E3 or E4 zone should be applied in the context of the Study Area, the following aspects have been considered in combination:

» The biodiversity significance and extent of the lands within the Study Area currently mapped Terrestrial Biodiversity or proposed as part of the draft Vegetation Mapping Planning Proposal (Refer to **Part 3.5.6**);

» The location and category of riparian land (Refer to opportunity for Riparian mapping under **Part 10.1.2**);

» The steepness of the area;

» The level of bushfire risk;

» The scenic value;

» Proximity to and connectivity with nature reserves and National Parks;

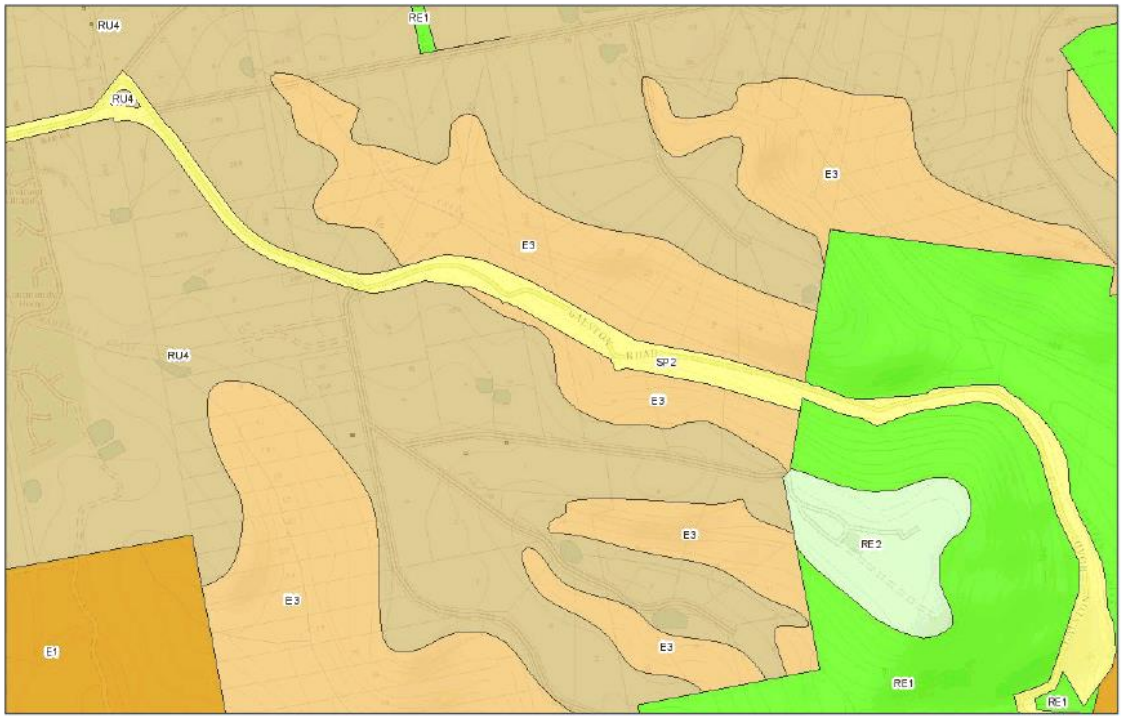
» High potential for site erosion; and,

» Existing lot size/development configuration on the site.

Where a number of these factors combine in such a way as to make it preferable to apply the restrictions of an environmental zone, the most suitable zone can then be considered.

Currently, in the context of Hornsby Shire, the E3 zone applies to areas of significant vegetation on rural lots, including those around Glenhaven, Galston Dural and Wisemans Ferry (**Figure 26**).

Figure 26 Areas of E3 within Hornsby Shire – Galston Road, GALSTON



Source: ePlanning Spatial Viewer, DPIE

The E4 zone currently applies to areas within Hornsby Shire where there is currently some form of low-density residential development, including Dangar Island and discrete coastal fringes of the Berowra Valley National Park (**Figure 27**):

Figure 27 Areas of E4 within Hornsby Shire – Dangar Island

Source: ePlanning Spatial Viewer, DPIE

The E3 zone is not considered appropriate in the context of the Byles Creek Study Area, where it is reserved for land where the primary use of the land is environmental management, and in the context of the Hornsby LGA, areas of significant vegetation on rural lots within the LGA. There is reasonable consistency in the use of E4 zones across the Councils surveyed as part of the case studies (**Part 8**). E4 is mostly used where residential land has some extant native vegetation and or related environmental / scenic values such as proximity to waterways and will fit well with the urban context of the Study Area.

Accordingly, the E3 zone has not been put forward for consideration as part of this Planning Study.

Key considerations:

Benefits:

- Consideration of an appropriate environmental zone may ensure optimal land use outcomes that are both environmentally sustainable and facilitate low impact residential development.
- Provides greater regulatory control over developments that may impact environmental values of the land.
- Council may wish to consider applying the E4 zone to similar lands with established environmental values that meet identified criteria

Constraints:

- Any change to a statutory planning instrument (the Hornsby LEP 2013) requires council to prepare a Planning Proposal to be determined by DPIE.

10.1.2 Increase the minimum subdivision lot size and review Clause objectives

The impacts of residential subdivisions and subsequent vegetation loss from new developments have been noted in the literature review, community consultation and the site constraints and opportunities analyses undertaken by Eco Logical Australia.

The fragmentation of land, specifically land that is environmentally constrained, should be avoided wherever possible. Subdivision of land in the Byles Creek Study Area increases density and is one of the main contributing factors to significant tree and habitat loss to accommodate new development.

Minimum lot sizes vary considerably across areas within the Hornsby the LGA (500sqm-40ha). Currently, the minimum lot size prescribed for the Study Area is 600m^2. This could be potentially increased to a more appropriate lot size in the context of the environmental and scenic values of the Byles Creek Study Area. This may also mitigate impact of future subdivisions of properties adjoining the Byles Creek corridor (RE1 – Public Recreation land).

The objectives of the minimum subdivision lot size Clause 4.1 within the Hornsby LEP 2013 includes:

- *To provide for the subdivision of land at a density that is appropriate for the site constraints, development potential and infrastructure capacity of the land*

There is also the opportunity to review and strengthen the minimum subdivision lot size clause in parallel with the minimum lot size to support the project objectives for the Study area as well as ensure environmental protection is enhanced more broadly across Hornsby Shire (Refer to the Northern Beaches Case Study for a best practise example of a minimum subdivision clause objectives from the Warringah LEP 2011).

Key considerations:

Benefits:

- Increasing the minimum lot size will mitigate environmental impacts of future subdivisions of properties adjoining the Byles Creek corridor.
- Increasing the minimum subdivision lot size supports the objectives of any Environmental zoning.
- Provides opportunity to enhance and strengthen objectives of the minimum subdivision lot size clause for broader application across the LGA.

Constraints:

- The majority of land within the Byles Creek Study area has been subdivided and application of an increased minimum lot size to preclude any further subdivision will only impact a small number of properties.
- Any change to a statutory planning instrument (the Hornsby LEP 2013) requires council to prepare a Planning Proposal to be determined by DPIE.

10.1.3 Mapping overlays

As demonstrated in the case studies (**Chapter 8**) Local environmental provisions may be applied where zone provisions need to be augmented in order to ensure that special environmental features are considered. For example, residential land that is still principally for residential purposes, but which contains environmentally sensitive areas may be zoned R2 – Low Density and the environmental sensitivities managed through a local provision and associated (overlay) map, such as Council's current Terrestrial Biodiversity mapping, or an Environmentally Sensitive Land and/or Riparian Land map.

Mapping overlays are less constraining than zoning prohibitions but provide an indicator of further consideration in the LEP. An overlay does not change the permissibility of uses on land, does not result in any additional restrictions on development and does not trigger the need for a development application. It serves as an "identifier" of specific issues that exist on the land that are to be addressed should a development application be required.

The DPIE's Practice Note (PN 09.002), highlights the advantages of environmental overlays, including:

- An environmental overlay does not change the zoning of land (e.g. residential) and the uses which are allowed under that zoning. It also has no impact on carrying out existing activities.
- The clause accompanying the overlay map lists the particular matters which Council must consider when assessing a development application on the land to which the overlay applies.

Terrestrial biodiversity mapping overlay

Biodiversity overlays exist in approximately 65% of all NSW Council LEPs (Survey of NSW Legislation website). The Hornsby LEP currently includes a terrestrial biodiversity overlay, which is largely restricted to the land zoned RE1 – Public Recreation within the Byles Creek Study Area which contain endangered ecological communities, threatened species.

It is noted that, concurrent to the Byles Creek Planning Study, Hornsby Shire are currently undertaking vegetation mapping across the LGA as part of a Planning Proposal. The Planning Proposal seeks to update and expand the Terrestrial Biodiversity Map within the *Hornsby Local Environmental Plan 2013* and replace the term "Terrestrial Biodiversity" with "Environmentally Sensitive Land" in Clause 6.4.

The objective of the Planning Proposal is to implement Council's policy intent to enhance the protection and management of vegetation by ensuring the appropriate level of consideration and assessment is undertaken for development proposals. The proposed mapping has been prepared in accordance with a sound evidence base,

including advice from ecologists. The outcomes of this project may also benefit the Byles Creek corridor and recommendations of the Planning Study align with this work.

Riparian mapping overlay

Riparian lands are those areas adjoining creeks, wetlands and other waterways. They are typically vegetated and support aquatic and terrestrial wildlife, reduce impacts from stormwater runoff and pollution, are an important part of the scenic and recreation landscape and provide a cooling effect in urban areas.

A riparian corridor forms a transition zone between the land and the waterway. Riparian corridors perform a range of important environmental functions such as:

» protecting water quality by trapping sediment, nutrients and other contaminants

» providing diversity of habitat for terrestrial, riparian and aquatic plants and animals

» providing connectivity between wildlife habitats

» conveying flood flows and controlling the direction of flood flows

» providing an interface or buffer between developments and waterway.

For the purposes of this report the term 'Riparian Land' includes land adjoining and including a waterway, such as Byles Creek.

Byles Creek accommodates several waterways located within an established riparian corridor, which are largely intact with some current developments encroaching within the corridor (i.e. located within 30m of the bank of the watercourse).

It emerged from the community consultation and the background review, that overall, Byles Creek and its tributaries are currently in good condition, however the edge effect of urban development alongside lower reaches of Byles Creek is evident.

The protection, restoration or rehabilitation of vegetated riparian corridors is important for maintaining or improving the ecological functions of a watercourse.

The implementation of landscaping around waterways provides opportunities to reinstate riparian corridors and habitat linkages. This will enhance flora and fauna, while reducing erosion and sediments entering the waterways and help reduce urban heat.

The Hornsby LEP 2013 does not include any local provisions or associated maps relating to riparian corridors. Additional local provisions can include riparian land clause requirements with accompanying maps. Including a riparian clause and mapping in an LEP gives Council greater regulatory control over developments that may impact environmental /ecological values of land.

This will enable a more rigorous assessment where there are significant environmental values, as identified through mapping, or other values such as biodiversity.

Example wording of a Riparian Land Clause developed from model clause provisions are provided below:

Riparian Land

(1) The objectives of this clause are to protect and maintain the following:

(i) water quality within waterways, and

(ii) native flora and fauna and their habitats, and

(iii) ecological processes within waterways and riparian lands, and

(iv) scenic and cultural values of waterways and riparian lands.

(2) This clause applies to Land identified as 'Riparian Land' on the Riparian Lands Map

(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must consider:

(a) whether the development is likely to have an adverse impact on the following:

(i) the surface and groundwater characteristics of the land, including water quality, water flows and salinity

(ii) native flora and fauna, including migratory species and the provision and quality of their habitats,

(iii) impact on, indigenous trees and other vegetation, including opportunities for additional planting

(iv) public access to, and use of, any public waterway and its foreshores, and

(b) any future rehabilitation or re-creation of the waterway and riparian areas, and

(c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development, and

(d) whether or not the development is likely to increase water extraction from the watercourse, and

(e) opportunity for the rehabilitation of existing piped or channelised waterways to a near natural state.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) is consistent with the objectives of this clause, and

(b) is designed, sited and will be managed to avoid any potential adverse environmental impacts, and

(c) if a potential adverse environmental impact cannot be avoided—the development will be managed to mitigate that impact.

Key considerations:

Benefits:

- Provides greater regulatory control over developments that may impact on the riparian corridor and provides opportunities to further enhance and preserve the corridor
- Enables a consistent approach to protecting waterways and riparian areas and to manage risks associated with waterways
- The intended conservation or management outcomes for land can be clearly articulated in the LEP and provides more certainty for land owners. With an overlay in place, there are no surprises, and the landowner will avoid any unnecessary redesigning of development, saving them both time and money.
- Areas are clearly defined (mapped) and controls streamlined
- An environmental overlay does not change the zoning of land (e.g. residential) and the uses which are allowed under that zoning. The overlay approach does not introduce absolute prohibitions on land use or development and is a flexible planning approach that is often more acceptable to the community and landowners.
- Zoning and riparian land overlays can be readily used in combination.
- Council may seek to apply this mapping overlay more broadly across the LGA where waterways occur

Constraints:

- Any change to a statutory planning instrument (the Hornsby LEP 2013) requires council to prepare a Planning Proposal to be determined by DPIE
- A small number of residential developments within the Study Area may already breach the core riparian zone, reducing the effectiveness of the proposed riparian mapping overlay in the short to medium term.
- Like with any environmental mapping overlay, investigations /ground truthing at a site scale for DA proposals may identify inaccuracies. Council will need to consider on merit, arguments relating to any inaccuracies within any 'Greenweb' mapping.

10.1.4 Floor Space Ratio

Currently, Hornsby LEP 2013 does not adopt an FSR development standard for land within the Study Area, which controls the amount of Gross Floor Area that can be incorporated on a site as part of a development. This is currently controlled by maximum height (contained in the LEP), minimum setback and landscaped area requirements in the DCP.

It is noted that other areas of the LGA which provide a E3 or E4 zone also provide an FSR of 0.3:1.

Council could consider adopting an FSR to reduce building footprints on the land, in conjunction with other options for implementation. This would need to be subject to further modelling and urban design analysis to understand the most appropriate FSR for the Study Area (beyond the scope of the Planning Study).

Key considerations:

Benefits:

- To better regulate the footprint of a development that is appropriate for the environmental site constraints and capacity of the land.
- A conservative FSR may address issues with APZ and impact on clearing as result of larger building footprints.

Constraints:

- A limit on the building size as a result of an introduced FSR control may potentially have a favourable or unfavourable economic and environmental impact when compared to no FSR control. The outcome may increase or decrease the development potential on the land depending on the land size and other characteristics of the land.
- This approach would require further urban design modelling to adopt an appropriate FSR for the Study Area.

10.1.5 Stormwater management

Stormwater run-off and subsequent impacts on erosion and water quality of Byles Creek have been noted in the literature review, stakeholder engagement and the site constraints and opportunities analyses undertaken by Eco Logical Australia.

Overall, Byles Creek and its tributaries are currently in good condition, however the edge effect of urban development alongside lower reaches of Byles Creek is evident. Where properties are in close proximity to the water, the creek is fringed by predominantly exotic species. The riparian vegetation adjacent to the Byles Creek tributary below the eastern end of Azalea Grove is in good condition, although the vegetation along the road edges and property boundaries is in poor condition and dominated by exotic shrubs and vines.

These observations highlight the importance of maintaining a vegetated buffer between residential development and watercourses within Byles Creek catchment. Runoff from new properties could lead to additional erosion and consideration of the quality and quantity of stormwater runoff from new developments is important.

Hornsby Shire currently does not include a stormwater management clause in its LEP.

Council may wish to consider the inclusion of a stormwater management clause in the LEP that requires urban development to:

- maximise water permeable surfaces to allow infiltration of water where soil allows;
- provide on-site stormwater retention for re-use where practical; and
- minimise and mitigate downstream impacts on adjoining sites, bushland and watercourses.

A stormwater provision could be included in the Hornsby LEP in accordance with the model clause provisions adopted by DPIE for broad application across the LGA. This could support the existing stormwater management provisions in the DCP.

Key considerations:

Benefits:

- To enhance regulation of residential stormwater management in the Study Area and the LGA more broadly.
- Implementation would require the control to be applied more broadly across the LGA.

Constraints:

- Councils Stormwater DCP controls are considered adequate to address stormwater management as part of new development within the Byles Creek Study Area.
- May require input from a suitably qualified Stormwater Engineer.

10.2 Hornsby DCP 2013

10.2.1 Biodiversity controls and 'GreenWeb'

Council may consider expanding the Biodiversity section of the DCP (1C.1.1) to include the Byles Creek Corridor (land adjoining RE1 Public Recreation) identified by the implementation of a mapping overlay which would support more specific and comprehensive biodiversity and landscaping planning controls.

A biodiversity or environmental mapping overlay (i.e. Sutherland Shire's 'Greenweb' as outlined in Chapter 8) could cover private land, rather than limited to significant habitat areas (i.e. the current Terrestrial Biodiversity LEP mapping overlay), which occurs largely on public land. This could be supported by more targeted provisions for Byles Creek and other comparable areas in the LGA. The purpose of a 'Greenweb' mapping overlay is to foster a consistent and strategic approach to biodiversity management. It would identify key areas of bushland habitat and establishes corridors to connect them so both plants and animals can move easily between them. This helps to maintain healthy populations and diversity.

Any 'Greenweb' would need to operate on both public and private lands, however the main objective is to target private property owners within the Greenweb network.

Council could also develop detailed controls which require habitat features to be incorporated into all new developments and significant alterations and additions to dwellings. This may include nest boxes which target native fauna species which occur in the Byles Creek corridor.

New DCP provisions could also require additional supporting documentation to be submitted with development applications, such as a landscape plan which includes habitat features such as nest boxes, as well as specific vegetation types and categories within buffer areas.

Key considerations:

Benefits:

» Support more specific and comprehensive biodiversity and landscaping planning controls.

Constraints:

» Site specific controls originally developed for Byles Creek have already been incorporated into the current DCP.

» Any 'Green Web' implementation would need to be considered holistically across the LGA, rather than limited to discrete areas such as Byles Creek, to ensure optimal effectiveness of this approach.

» Like with any environmental mapping overlay, investigations /ground truthing at a site scale for DA proposals may identify inaccuracies. Council will need to consider on merit, arguments relating to any inaccuracies within any Greenweb mapping.

» It is not considered that incorporation of habitat features within new developments will resolve the more significant environmental impacts occurring within Byles Creek, such as canopy tree loss. Therefore, strengthening existing DCP controls or adding to them may be limit in their effectiveness and may add further complexities to an already comprehensive DCP in terms of biodiversity protection and tree preservation.

10.2.2 Watercourses

Currently, the Hornsby DCP includes provisions for watercourses (Part 1C.1.3) which apply to the Riparian Areas of Byles Creek. The objectives of these provisions are to retain and enhance watercourses such as creeks and rivers, as well as the native riparian vegetation within waterway corridors.

Amongst other measures, these provisions include:

The design and location of any development should seek to maintain an effective riparian area and comply with best practice guidelines, that may require:

» *A core riparian zone (CRZ) that is the land within and adjacent to the channel. The width of the CRZ from the banks of the stream is determined by assessing the importance and riparian function of the watercourse, and*

» *A vegetated buffer (VB) that protects the environmental integrity of the CRZ, with a minimum width of 10 metres*

It is considered that a mandated vegetated buffer could support the above DCP provisions.

Key considerations:

Benefits:

» Regulating riparian vegetated buffers in the LEP may help better achieve the objectives of the controls, which seek to retain and enhance watercourses such as creeks and rivers, as well as the native riparian vegetation within waterway corridors.

Constraints:

» Any Bushfire Asset Protection Zone (APZ) should be measured from the asset to the outer edge of the vegetated buffer (VB). The APZ should contain managed land which should not be part of the CRZ or VB, however this requirement is often overridden by the Planning for Bushfire Protection Guidelines, particularly on constrained sites.

10.2.3 Site Coverage

Council may consider a review of the current maximum site coverage requirements on residential land and look to reduce these controls within the Byles Creek Study Area.

The current maximum site coverage requirements are as follows:

Table 5 Current Maximum Site Coverage controls in the DCP

Lot area	Max site coverage (% of total lot size)
200m2 to 249m2	65%
250m2 to 299m2	60%
300m2 to 449m2	55%
450m2 to 899m2	50%
900m2 to 1499m2	40%
1500m2 or larger	30%

Key considerations:

Benefits:

» A reduction of building footprint may reduce the impact in vegetation within the Study Area

Constraints:

» A high-level lot audit undertaken as part of the analysis indicates that many of the existing and proposed development are generally not meeting the maximum site coverage requirements on the land (due to site constraints and other development controls restricting the building footprint), thus any review may have little impact on benefiting the outcomes in Byles Creek

» Maximum site coverage in the Byles Creek Study area would need to be encompassed as part of a site specific DCP for Byles Creek

» Requires further urban design modelling to adopt an appropriate site coverage for land within the Study Area

10.3 Other Opportunities

In combination with changes to the local planning framework, there are a number of options through other mechanisms to improve environmental outcomes on private property within the Byles Creek corridor, summarised in the table below.

Table 6 Other opportunities for change

Option	Description
Community education and awareness programs	Many land owners are conserving biodiversity on their lands as a matter of choice. Council might provide awards and recognition for properties with conservation plans and demonstrated protection. Promoting increased education and awareness of the benefits of managing land in a way that maintains or improves biodiversity values of Byles Creek. Council can have a role in education and support for land care and other programs to improve biodiversity and support land owners in such work. For example: » free ecological consultation from Hornsby Shire to the community to map and identify endemic vegetation and explore ways to protect and enhance biodiversity on a site-by-site basis. » education of landholders, developers and urban planners (workshops, plant procurement, access to council resources) » free materials such as nest boxes and other habitat features. Many landholders in the Byles Creek Study Area are conserving biodiversity on their lands as a matter of choice. Some have been doing so for generations. Council might provide awards and recognition for properties with conservation plans and demonstrated protection activities. Sponsors might be sought, and formal nominations requested annually for an award. Council could provide additional interpretation in the area to increase understanding of importance of natural areas as well as improve public access to this valuable natural asset.
Conditions of consent	Post development approval conditions of consent should ensure planning controls are enforced during the development process but could be strengthened to reflect the environmental qualities for private lands of the Byles Creek area. For example, by

Option	Description
	including development consent conditions that require a higher number of trees to be planted for everyone removed, and for specific habitat features to be incorporated into developments. Applying conditions of consent could be investigated which seek to avoid or minimise the potential impacts of companion animals (dogs and cats) where development proposals adjoin habitat such as core habitats, National Parks and Wildlife Protection Areas.
Covenants	Council can provide good biodiversity outcomes on land subject to a subdivision DA by including (as a condition of development consent) the requirement for a covenant to be placed over the native vegetation/other habitat on that land (comprising threatened species/ecological communities), in accordance with Section 88B of the *NSW Conveyancing Act 1919*. The particular requirements of the covenant are specified in the condition of consent; for example, the requirements can include the retention, conservation, rehabilitation and management in perpetuity of all native vegetation/other habitat, plus monitoring and reporting, in accordance with an environmental management plan or similar approved by the relevant Council biodiversity/bushland management staff. The covenant is registered on the title of the land and can only be released, varied or modified by Council under the provisions of section 28 of the EP&A Act and Clause 1.9A of the Hornsby LEP 2013.
Voluntary Planning Agreements	Council could consider the use of Planning Agreements and similar voluntary and negotiable techniques to add to biodiversity as part of planning proposals, for example, to put towards enhancement and protection of the Byles Creek corridor.
Financial incentives	Offer of financial incentives (grants, design competitions, rates rebates, biobanking) may encourage / expedite better environmental outcomes
Enforcement and regulation	Enforcement procedures and penalties for unauthorised development activities will be undertaken in accordance with Council's compliance and enforcement policy, relevant legislation and associated regulations.
Weed and pest management	Council should continue to manage weeds on private land in accordance with its function as the local control authority under Section 371 of the *NSW Biosecurity Act 2015*. Pest animals (such as foxes and feral cats) be managed in accordance with the NSW Government's Greater Sydney Regional Strategic Pest Animal Management Plan and nuisance pets (dogs and cats) pursuant to the *Companion Animals Act 1998*. Council's approach to the management of invasive species should also include maximising the effectiveness of pest animal and weed control programs by coordinating with other land management agencies, neighbouring councils and private landowners. The above could be implemented partly though a Plan of Management for the land zoned RE1 Public Space which forms the core part of the Byles Creek corridor.
Artificial habitat features	Installation of nest boxes on private and public land funded through grants. Although a number of hollow-bearing trees occur throughout the study area, installation of specific nest boxes (i.e. those which could accommodate the Gang Gang Cockatoo) would create additional nesting habitat for a range of native fauna.

Key considerations:

Benefits:

» Promoting increased education and awareness of the benefits of managing land in a way that maintains or improves biodiversity values of Byles Creek.

Constraints:

» It is noted that these recommendations would require careful consideration as they may have financial and resourcing impacts on Council which may be difficult to obtain.

» The Department are soon to release standard conditions of consent; thus, any review of conditions may need to align with these changes.

» The use of VPAs are constrained where they need to relate to the proposal and are ordinarily associated with more significant proposals (i.e. rezoning where there is uplift).

» Restrictive covenants are often difficult to implement and can often be overridden by Council or challenged in court.

11 Recommendations

Based on findings of the background and literature review and evaluation of the opportunities (**Chapter 10**) and outcomes of the community feedback received during the consultation period, the following sub-chapters provide recommendations for Council's local planning framework, and other supporting mechanisms, to enhance and protect the environmental values of Byles Creek on private land.

Based on a detailed review of the current DCP provisions (Part 7.2.2) it is considered unlikely any revised DCP controls will support a significant improvement on the current issues arising from new development in the Byles Creek corridor. This sentiment was generally echoed in the stakeholder engagement undertaken with landowners, community interest groups and the broader community.

As such, the recommendations provided in the following sub-sections are focused on implementation of new land use zoning initiatives within the framework of the current Hornsby LEP 2013, supported by supplementary controls associated with the land in both the LEP and the DCP.

11.1 Environmental Zoning

Recommendation Re-zone land within the study area currently zoned R2 – Low Density Residential to E4 – Environmental Living as shown in the mapping below:

Application	Land within the Study Area currently zoned R2 Low Density Residential
Mechanism	Land Use mapping in the Hornsby LEP 2013 It is noted that minor amendments to the DCP (Part 3 – Residential) will be required to support residential development within the E4 zone.
Justification	The E4 – Environmental Living Zone is for land with special environmental or scenic values and accommodates low impact residential development. The Byles Creek Study Area encompasses unique environmental characteristics and constraints which supports the rezoning to E4 (detailed under **Part 5** of the Planning Study). The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area. The Study Area also provides steep terrain, watercourses and supporting riparian corridors and is highly bushfire prone. Byles Creek and surrounding land within the Study Area also contains significant biodiversity values, including critically endangered ecological communities such as the Blue Gum High Forest and regionally significant Coachwood Rainforest. It provides known habitat for the endangered Gang Gang Cockatoo and threatened Powerful Owl. It is proposed to only apply the E4 zoning to land currently zoned R2 within the Study Area, where: > The majority of lots within the Study Area have an interface with the Byles Creek core corridor (i.e. land zoned RE1 – Public Recreation) > The land generally provides high to medium environmental and ecological values, land constraints such as steep topography and bushfire affectation > The Study Area is readily defined where it is bounded by Malton Road, Sutherland Road, Azalea Grove, Kurrajong Street, and Lane Cove National Park. Implementation of the E4 zone across residential land within the Study Area will ensure optimal land use outcomes that are both environmentally sustainable and facilitate low impact development. It will give Council greater regulatory control over developments that will impact or have potential to impact on environmental values of land. There is reasonable consistency in the use of E4 zones across the Councils surveyed as part of the case studies (**Part 8**). E4 is mostly used where residential land has some extent native vegetation and or related environmental / scenic values such as proximity to waterways. Furthermore, the proposed rezoning will meet the relevant objectives and provisions of Section 9.1 Ministerial Direction (3.1 – Residential Zones), where it: > Retains provision to enable a variety and choice of housing types permissible in the current R2 zone > Minimises the impact of residential development on the environment > Will not impact upon the permissible density of land, (subject to strengthened environmental impact considerations) > Is supported by a planning study (this Study).

Economic Implications

The 'highest and best use' between R2 and E4 zoned land is similar and there are no proposed changes to the development controls associated with this recommendation.

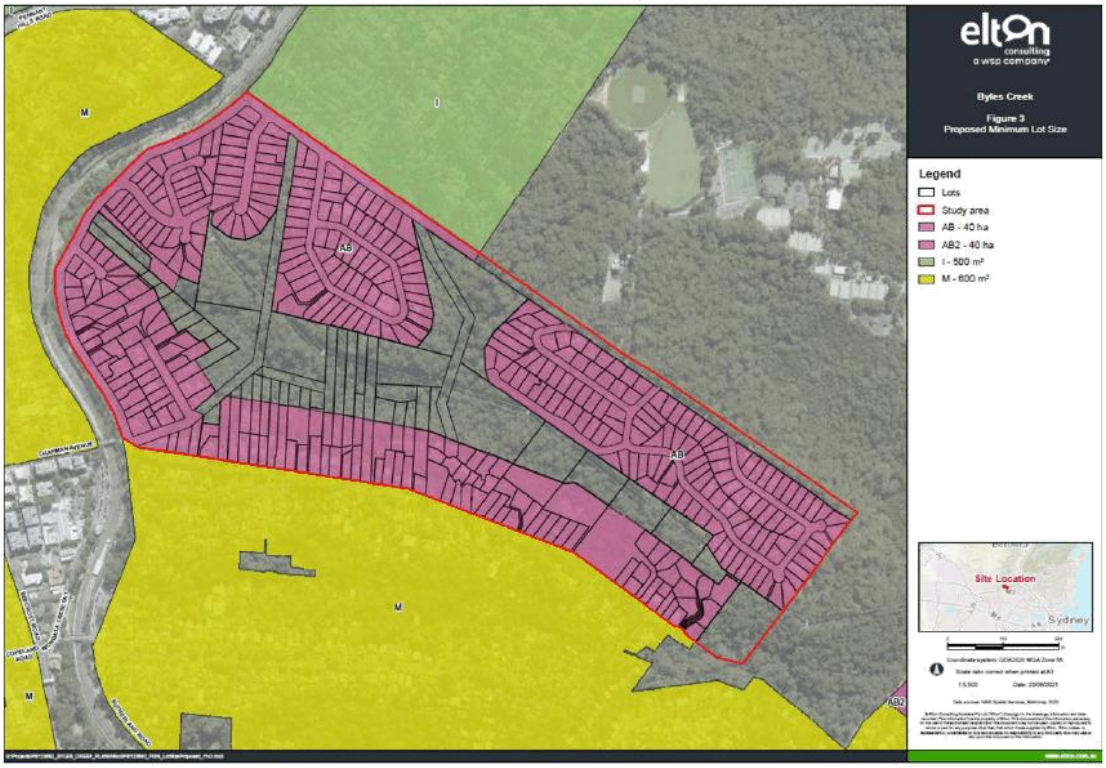
It will not trigger any additional development applications or restrictions but will identify matters to be considered in the assessment of DAs.

Accordingly, it is not anticipated that there will be any significant economic implications associated with the rezoning.

11.2 Minimum Subdivision Lot Size

Recommendation

Increase minimum lot size for land proposed to be zoned as E4 – Environmental Living to 40ha.



Application

Land within the Study Area currently zoned R2 Low Density Residential.

Mechanism

Update Clause 4.1 Minimum Subdivision Lot Size and associated mapping within the Hornsby LEP 2013.

Justification

Increasing the minimum subdivision lot size is linked with the recommended E4 zoning, where the current minimum lot size of 600m^2 is not conducive to meeting the E4 zone objectives, which seek to enhance and protect the special environmental characteristics of the area

Land Currently zoned E4 under the Hornsby LEP 2013 provides a minimum lot size of 40ha. The prosed 40ha minimum subdivision lot size ensures consistency with application of the clause and ultimately would preclude any further subdivision within the Study Area.

A preliminary lot audit has been undertaken which indicates that there are only a very small proportion of lots within the Study Area which have subdivision potential, many of which may have environmental constrains such as steep topography which would prevent subdivision under current planning controls.

Accordingly, it is considered that increasing the minimum subdivision lot size will not significantly impact the majority of landowners in terms of economic impacts of land value, however, is important to retain the integrity of the E Zone and consistency of the minimum lot size for E4 across the LGA.

Economic Implications

A lot audit undertaken by AEC concludes that only a small number of sites were identified to have potential for subdivision within the Study Area. Although there may be an economic impact (reduced land value) on an individual lot-by-lot basis, a change in the minimum lot size will have a minimal economic impact to the Study Area as a whole as most lots appear to be fully developed.

11.3 Minimum Subdivision Lot Size objectives

Recommendation

Strengthen the wording of Clause 4.1 objectives to protect and enhance existing bushland and significant native vegetation.

Application

All land within the Hornsby LGA

Mechanism

Update objectives of Clause 4.1 Minimum Subdivision Lot Size in the Hornsby LEP 2013

Justification

Enhancing the Minimum Subdivision Lot Size clause objectives would be applied more broadly across Hornsby Shire. Strengthening the clause objectives will ensure that adequate consideration is given to bushfire constraints and protection of bushland, biodiversity and significant landscape features when considering applications for subdivision.

Economic Implications

An update to the objectives of Clause 4.1 is unlikely to impact the land values of private residential property owners in the Study Area. However, it may lead to additional environmental reports to be attached to future development applications, resulting in additional costs and time.

11.4 Riparian Land

Recommendation Insert a new Local Provision Clause – Riparian Land into the Hornsby LEP 2013 and provide supporting riparian corridor mapping.

Application Land containing watercourses within the Study Area.

(May be applied more broadly across the LGA subject to further investigation)

Mechanism Insert new Local Provisions Clause into the Hornsby LEP 2013.

It is noted that minor amendments to the DCP (Part 1C.1.3 – Watercourses) will be required to support controls for riparian zones.

Justification It emerged from the environmental analysis (**Part 5**) supported by the stakeholder consultation there are impacts from residential development on the existing Byles Creek riparian corridor.

The proposed Riparian Lands Clause in the LEP seeks to protect and maintain the ecological habitat accommodated by the waterways and associated riparian corridors within Byles Creek and the surrounding Study Area. It seeks to ensure that all development along the riparian corridor have consideration for the environmental impacts to the waterway, as well as enhancing and re-establishing riparian vegetation and supporting important corridor linkages.

It presents a significant opportunity to mandate a riparian corridor which will assist to provide supporting habitat and enhance biodiversity linkages in this part of Hornsby Shire

The mapping should be based on the riparian mapping and assessment outlined **in Section 5.3** of the Planning Study incorporating first, second and third order watercourses which occur within the Study Area and prescribed Core Riparian Zone (CRZ) in accordance with the Strahler stream order classification system:

- 1st Order – 10m (each side of the watercourse)
- 2nd Order – 20m (each side of the watercourse)
- 3rd Order – 30m (each side of the watercourse)

This approach to riparian corridor buffers is consistent with the best practise guidelines for riparian corridors administered by the NSW Office of Water.

This will assist Council to more effectively maintain and rehabilitate riparian areas within the Study Area on private land and ensure appropriate buffer areas are applied to new development. This will enhance flora and fauna and bank stability, while reducing erosion and sediments entering the waterways and help reduce urban heat.

It will enable a more rigorous assessment where there are significant environmental values, as identified through mapping, or other values such as biodiversity.

The new Riparian Land clause and supporting mapping will also ensure a consistent approach to protection, management and enhancement of the waterway and supporting habitat such as the incorporation of locally occurring riparian vegetation and can be applied more broadly across the LGA where waterways occur.

In the context of Hornsby Shire, the key objectives provisions of the new Clause should seek to enhance and rehabilitate the connectivity of locally indigenous riparian vegetation along waterways and provide habitat to support native fauna. The Clause should provide requirements to ensure the objectives are achieved. Example wording is provided in **Part 10.2** of the Planning study.

The new clause and mapping will be readily supplemented by the current DCP prescriptive measures (pursuant to Part 1C.1.3 – Watercourses; Riparian Areas) which seek to provide 10m vegetated buffers to protect the integrity of the Core Riparian Zone (CRZ). Accordingly, it is recommended that the prescriptive measures reflect the mapping in the Hornsby LEP 2013 to enhance their application.

Economic Implications

A mapping overlay and accompanying clause does not change or otherwise affect the zoning of land or the permissibility of uses and only applies as a matter for consideration in the assessment of a development where an application would already be required.

Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, the new Clause and mapping overlay serves to further enforce riparian buffer provisions which exist in the DCP.

Accordingly, this recommendation is not expected to have a significant impact on land values to property owners in the Study Area.

11.5 Community education and awareness programs

Recommendation

Increase community engagement programs targeting the Study Area

Application

Community engagement programs may include (but should not be limited to):

- Preparation of guidelines and informative material, such as habitat creation for backyards
- Incorporation of interpretive signage to increase awareness and educate the community of the unique and significant flora and fauna which occur in the area (This can include signage relating to the presence of Critically Endangered Ecological Communities and habitat for threatened fauna including Powerful Owl).
- Coordination of community workshops and other interactive education programs with the assistance and support of State government grant funding
- Native plant giveaways (i.e. locally indigenous seedlings) for landowners within the Study Area
- Encouraging responsible ownership of domestic animals (e.g. dogs, cats) in accordance with the *NSW Companion Animals Act 1998* to avoid potential impacts to native fauna.

These community education programs should be undertaken in parallel with any changes to planning controls.

Justification

A key emerging theme from the background review and stakeholder consultation is the importance of increasing community awareness, foster a sense of ownership and obtain community 'buy-in", as well as personal connection to the natural environment through community education programs.

These initiatives align with the priorities and actions in the Hornsby Shire LSPS and other local strategic planning documents endorsed by Council.

Economic Implications

Community education programs will increase awareness and likely to result in a positive social outcome for the community and there is no perceived impact on land values to the property owners.

Notwithstanding, Council could potentially incur costs associated with education programs thus may require support through external funding (i.e. State government grants etc.).

12 Economic considerations

Implementation of new and/or revised planning controls which have the potential to impact future development, may have an economic impact on a site's development potential. Conversely, potential benefits are provided where the land will contain a high-quality landscape amenity in the private realm, subsequently retaining or increasing property value in the area.

These impacts have been assessed and evaluated as part of the recommendations put forward for consideration in the Planning Study.

An Economic Implications Analysis of the Planning Study recommendations has been undertaken by AEC (provided in **Appendix B.** The potential economic impacts are summarised in the following table:

Table 7 Summary of Economic Implications

Summary of Economic Implications		
Option	**Description**	**Potential Economic Impact**
Environmental zoning	Rezone all land from R2 - Low Density Residential to E4 – Environmental Living within the Study Area.	**Minimal** A reduced number of permissible land uses resulting from a rezoning may potentially impact the marketability of the property depending on the Environmental zone. The 'highest and best use' between R2 and E4 zoned land is similar for both zones (i.e. dwellings). Accordingly, it is unlikely that there will be an economic impact as result of the rezoning to E4.
Minimum subdivision lot size	Increase minimum lot size from 600m^2 to 40ha for land proposed to be zoned as E4 – Environmental Living.	**Minimal to the Study Area as a whole** Only a small proportion of sites were identified to have potential for subdivision within the Study Area. Although there may be an impact on these owners on an individual lot-by-lot basis, a change in the minimum lot size will have a minimal impact to the Study Area as a whole, as most lots appear to be developed.
Minimum subdivision lot size objectives	Strengthen objectives of the clause to ensure sufficient consideration of environmental and ecological impacts to land associated with any application for subdivision	**Minimal** An update to the objectives of Clause 4.1 is unlikely to impact the land values of private residential property owners in the Study Area. However, it may lead to additional environmental reports to be attached to future development applications, resulting in additional costs and time.
Riparian Land	Insert a new Local Provision Clause – Riparian Lands, for incorporation into the LEP and provide supporting map.	**Minimal** A mapping overlay and accompanying clause does not change or otherwise affect the zoning of land or the permissibility of uses and only applies as a matter for consideration in the assessment of a development where an application would already be required.

Summary of Economic Implications		
		Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, the new Clause and mapping overlay serves to further enforce riparian buffer provisions which exist in the DCP. Accordingly, this recommendation is not expected to have a significant impact on land values to property owners in the Study Area.
Community education programs	Increase community engagement and activity to help increase community awareness, foster a sense of ownership and obtain community 'buy-in", as well as personal connection to the natural environment.	**No economic impact to landowners** Community education programs will increase awareness and likely to result in a positive social outcome for the community, however, there is no perceived impact on land values to the property owners. Notwithstanding, Council could potentially incur costs associated with education programs thus may require support through external funding (i.e. State government grants etc.).

Source AEC, June 2021

13 Conclusion

The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area.

Based on findings of the background and literature review, and evaluation of the environmental opportunities and constraints, and outcomes of the community feedback received during the consultation period, the Byles Creek Planning Study provides recommendations for changes to the Hornsby LEP 2013 supported by community education programs, to enhance and protect the environmental values of Byles Creek on residential zoned land.

These recommendations include:

- Changes to land use zoning; from R2- low density residential to E4 – environmental living;
- Increases to minimum subdivision lot size and strengthened objectives; and
- Riparian land mapping overlays and supporting provisions.

Community education programs should be undertaken in parallel with the above planning framework changes.

Council will consider the implications of the recommendations outlined in this Study at the August General Meeting 2021 to establish an endorsed position for public exhibition.

Appendices

A Site Constraints & Opportunities Analysis

B Economic Implications Analysis

C Consultation Outcomes Report

ATTACHMENT 1 - ITEM 6

A Site Constraints & Opportunities Analysis

ATTACHMENT 1 - ITEM 6

Byles Creek Land Use and Environmental Constraints Assessment

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
CAA	Controlled Activity Approval
CEEC	Critically Endangered Ecological Community
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (now DPIE)
DEEC	Department of Energy, Environment, and Conservation (now DAWE)
DAWE	Department of Agriculture, Water and the Environment
DPIE	Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd.

EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
FFA	Flora and Fauna Assessment
FM Act	*Fisheries Management Act 1994*
KFH	Key Fish Habitat
KTP	Key Threatening Processes
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
PW	Priority Weed listed under the *Biosecurity Act 2015*
PCT	Plant Community Type
OEH	Office of Environment and Heritage (now DPIE)
REF	Review of Environmental Factors
SIS	Species Impact Statement
SSDA	State Significant Development Application
TEC	Threatened Ecological Community
WM Act	*Water Management Act 2000*

1. Introduction

1.1. Purpose of the study

Hornsby Shire Council are undertaking a study to review the sustainability of planning controls in maintaining the environmental qualities of residential lands adjoining the open space zoned lands within the Byles Creek corridor. The study area is shown in Figure 1.

Eco Logical Australia were engaged to provide the following inputs to the review:

- *Identify and map the environmental constraints of residential lots by consideration of the following attributes:*
  - *Topography;*
  - *Proximity to watercourse;*
  - *Water quality;*
  - *Soil dispersibility;*
  - *Soil landscapes;*
  - *Plant communities;*
  - *Proximity to bushland;*
  - *Fauna habitat;*
  - *Threatened and endangered species and ecological communities in consultation with ecologist with appropriate skills;*
  - *Bushfire prone land by category;*
  - *Economic implications;*
  - *Infrastructure constraints; and*
- *Prepare analysis of these attributes ability for limiting development potential of residential zoned lots.*

1.2. Background

In 1995, the Byles Creek Catchment Environmental Study investigated approximately 350 hectares of land in the Byles Creek corridor, Beecroft. It found the Study Area had high environmental quality, aesthetic and heritage values and recommended that the Open Space zoning be retained on the publicly and privately-owned land.

Following this the Byles Creek Development Control Plan (DCP) was adopted in 1998. To protect the environmental values, development controls were introduced for setbacks, soil and water management based on soil type, environment protection, fencing, bushfire management, and development treatments relating to urban watercourse interface areas and land compatibility and sensitivity.

In 2006, an Open Space Review evaluated privately owned land zoned Open Space A to ensure that they met community needs and preserved environmental qualities. In the Byles Creek corridor, the Review recommended the retention of the open space zoning and acknowledged acquisition of privately-owned lots was required.

The Hornsby Development Control Plan 2013 was brought into effect and included the previous Byles Creek DCP area.

In August 2020, the Byles Creek Land Acquisition Strategy Review examined the strategic approach to land acquisition within the Byles Creek catchment to protect the ecological values of the corridor. It found the current RE1 zoning would protect its biodiversity values and ecosystem functionality and meets the objectives and terrestrial biodiversity provisions of the Hornsby Local Environmental Plan (LEP).

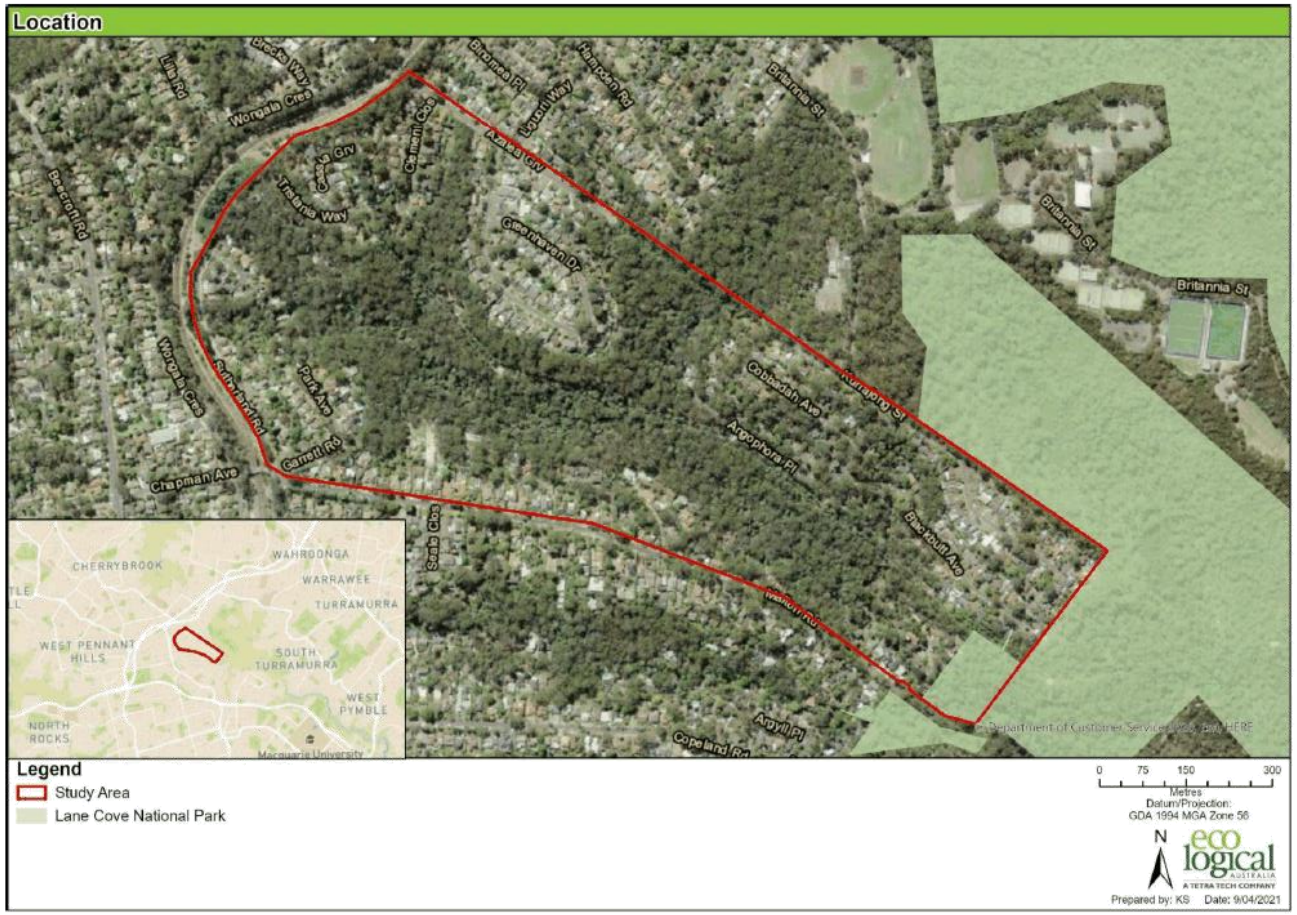

Figure 1: Location of the study area

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2. Statutory Framework

Commonwealth and State legislation and policies, as well as local policies are relevant to the land use and environmental constraints assessment, planning the study area. A brief outline of the relevant Commonwealth and State Acts and Policies, and local policies, are provided below in Table 1.

Table 1: Legislative context

Name	Relevance to the project	Section in this report
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified as having a potential to occur within the locality. This report assesses the likelihood of occurrence of MNES within the site and assess potential impacts of the proposal on MNES.	Sections 9 and 10, Appendix 1
NSW		
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of planning and development proposals. The planning study is prepared under Part 3 of the EP& Act 1979.	N/A
Biodiversity Conservation Act 2016 (BC Act)	The BC Act governs the listing of threatened species, populations and ecological communities. It contains the principles to avoid, minimise and offsets impacts on biodiversity. For developments under Part 4 of the EP&A Act, a Biodiversity Development Assessment Report (BDAR) or BDAR waiver may be required.	Sections 7, 8, 9 and 10
Biosecurity Act 2015	Under the *Biosecurity Act 2015*, priority weeds have been identified for local government areas and assigned strategies to contain, remove or manage. Occupiers of land (this includes owners of land) have responsibility for taking appropriate action for priority weeds on the land they occupy. Priority weeds listed under the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (updated 2019) are relevant to study area	Sections 6 and 7
Water Management Act 2000 (WM Act)	The Study Area contains watercourses mapped on the *Water Management (General) Regulation 2018* hydroline spatial data. Waterfront land is defined as within 40 m from the top of bank of these watercourses and any development on waterfront land is considered a Controlled Activity, requiring a Controlled Activity Approval (CAA) under s91 of the WM Act. However, under Clause 29 of Schedule 4 of the *Water Management (General) Regulation 2018*, any kind of controlled activity carried out in connection with development for a dwelling house or dual occupancy building that does not involve works in or on the bed of any channel is exempt from requiring a CAA.	Section 4
Fisheries Management Act 1994 (FM Act)	The FM Act governs the management of fish and their habitat in NSW. The Schedules of the Act list key threatening processes and threatened species. The FM Act regulates the provision of permits required in relation to harm to protected marine vegetation (seagrass, macroalgae, mangroves and saltmarsh), dredging, reclamation or obstruction of fish passage on or adjacent to Key Fish Habitat (KFH). This includes direct and indirect impacts, whether temporary or permanent. The third order reach of Byles Creek is mapped as KFH by DPI Fisheries.	Section 4

Name	Relevance to the project	Section in this report
Rural Fires Act	The RF Act is integrated into the EP&A Act and triggered by Section 4.46 of the EP&A Act.	Section 11
Planning Instruments		
Hornsby Local Environmental Plan (2013)	The study area is mapped as RE1 and R2 under the Hornsby Local Environmental Plan (LEP) 2013. Hornsby LEP contains provisions and mapping relating to biodiversity, under Section 6.4 of the LEP and the Terrestrial Biodiversity Map.	N/A

3. Topography

3.1. Methodology

Slope data provided by Hornsby Shire Council and includes the following:

- 20cm DEM raster file
- 20cm DSM raster file
- 20cm Slope raster file).

Figure 2 shows the 20cm slope raster file classified into groups of 5° increments from 0° to 45 and then measurements exceeding 45°.

3.2. Slope Maps

Figure 2: Slope map classified in increments

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3.3. Results and Discussion

The topography of study area ranges from flat in mainly residential areas to very steep along ridge lines. Tributaries of Byles Creek begin in the north west and central north and meet in the centre of the study area. The riparian areas surrounding Byles Creek and its tributaries comprise of majority vegetated bushland with some riparian areas located along the urban interface in the northwest.

Land zoned as public open space extends over steeply sloped terrain, whilst existing residential locations are generally situated in areas where topography is more suitable for development. Steep slopes exceeding 45° around the ridge lines are evident along contours of greatest elevation sloping down towards streamlines.

Increased risks associated with slope included greater bushfire, erosional, landslip and flood risk. Slope assessments are a critical component in determining bushfire risk. The NSW Rural Fire Service Planning for Bush Fire Protection (2019) provides the framework for assessing bush fire risk. Slopes greater than 18° are difficult to maintain subsequently reducing effectiveness of an asset protection zone and therefore are not recommended for such a use. Bushfire constraints are discussed in further detail in the Bushfire section of this report.

The soils landscapes are Hawkesbury, Glenorie, Lucas Heights and West Pennant Hills and are discussed in more detail in the Soil Landscapes section. The predominate soil landscape at Byles Creek is Hawkesbury and is described as rugged, rolling to very steep hills of Hawkesbury sandstone, this soil landscape makes up approximately 65% of the study area. The limitations associated with the Hawkesbury soil landscape are mass movement hazard, rockfall hazard, steep slopes, server erosional hazard, rock outcrop and shallow soil; and is not generally not capable for urban development. The Hawkesbury soil landscape makes up 90% of the Open Space area.

As a result of the topography and soil landscape within the Byles Creek study area, and in particular on land designated as Open Space,–urban development would likely be constrained without extensive earthworks and stabilising mechanisms due to steep slopes and associated risks.

4. Watercourse Assessment

4.1. Methodology

4.1.1. Literature and database review

A review of the following relevant data, background literature on the study area and locality, and relevant planning instruments and strategic documents was undertaken:

- *Water Management (General) Regulation 2018* Hydroline spatial dataset
- Fisheries Spatial Portal and threatened species distribution maps (Riches et al, 2016).

4.1.2. Site inspection

A site inspection was completed by ELA Aquatic Ecologist Claire Wheeler on 31 March 2021. Rainfall had fallen in the catchment within the previous week.

The study area was traversed on foot and the survey focused on identifying the condition of the watercourses within the study area, including instream habitat, riparian vegetation and a visual assessment of water quality. Notes and photographs were taken during the site inspection.

4.2. Watercourse maps

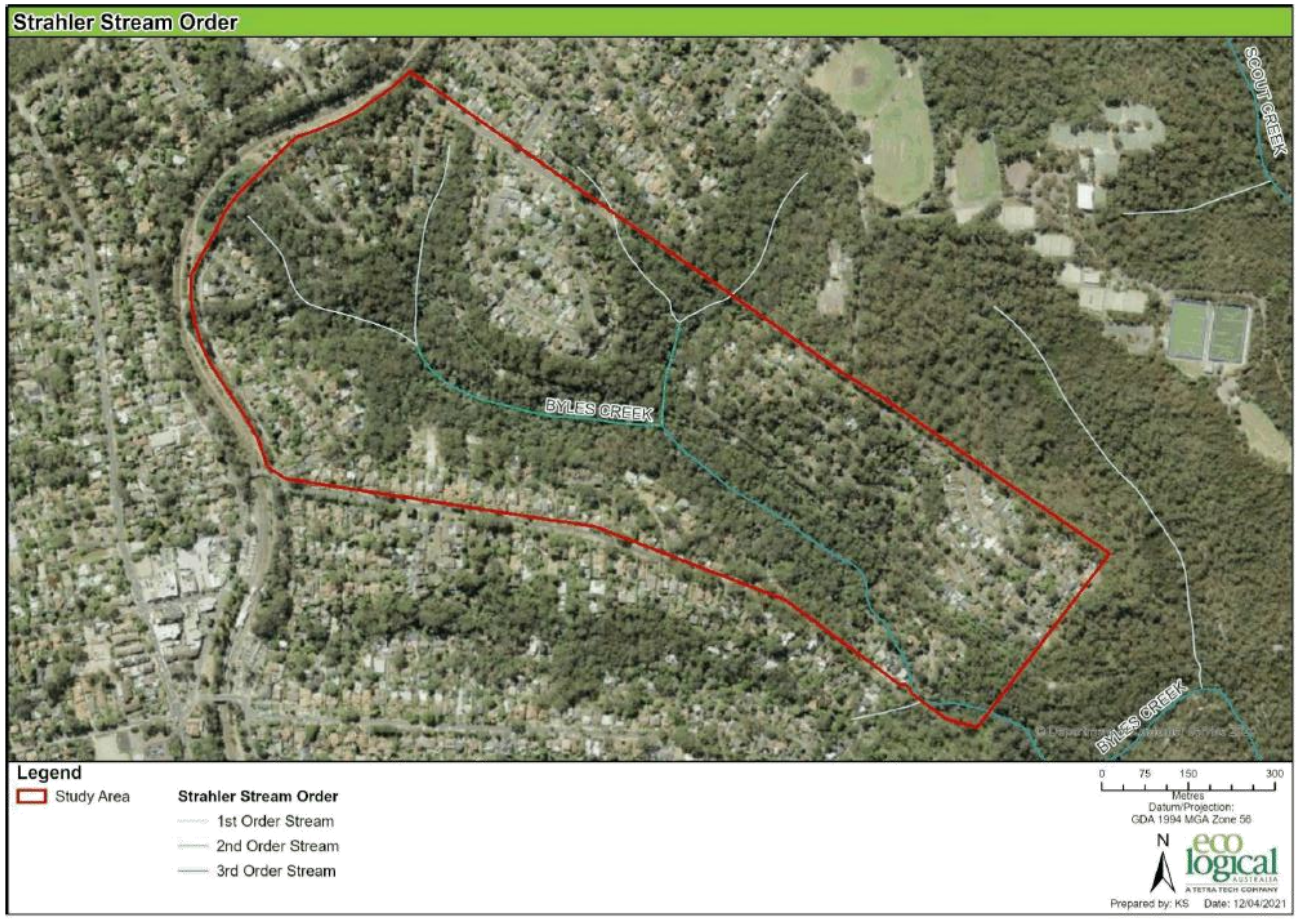

Figure 3: Watercourses and their Strahler classifications within the study area

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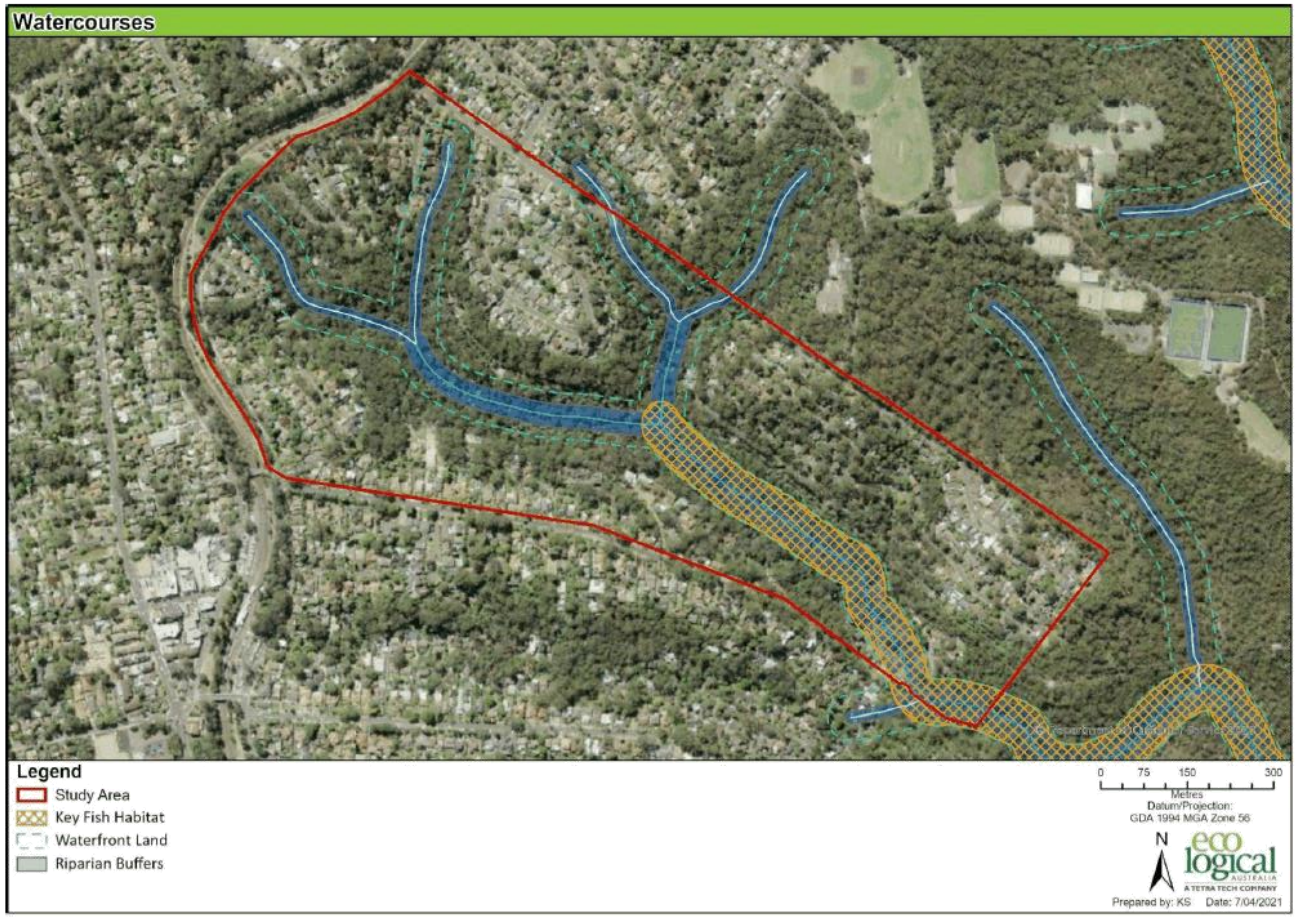

Figure 4: Recommended riparian corridor widths and mapped key fish habitat

4.3. Results and Discussion

Within the study area there are seven watercourses that are all tributaries of Byles Creek. Four first order, two second order and one third order creeks were mapped within the study area boundary (Figure 3). These watercourses and their riparian zones varied in condition, likely as a result of their position in the catchment.

At one of the upstream extents of the study area, the first order tributary below Azalea Grove was a steeply sloping, bedrock-controlled watercourse at the bottom of a steep gully (Figure 5 and Figure 6). The vegetation along the road edges above the creek was predominantly exotic, comprised of *Ligustrum lucidum, Ligustrum sinense* and *Senna pendula.* However, at the bottom of the gully along the creekline, the vegetation was predominantly native.

Below Angophora Place, Byles Creek was in very good condition, with very few exotic species observed and a variety of instream habitats were present, including riffles, runs and pools (Figure 7 and Figure 8). Water clarity was generally good, with the water slightly turbid most likely due to rainfall received in the prior days.

Byles Creek behind the lower end of Malton Road was still a bedrock controlled channel, however the riparian vegetation was predominantly exotic (Figure 9 and Figure 10), with canopy trees smothered in *Cardiospermum grandiflorum* (Balloon Vine) and *Setaria palmifolia* (Palm Grass) and *Ageratina riparia* (Mistflower). The vegetated riparian zone in this area was narrow, with residential properties located relatively close to the watercourse.

Overall, Byles Creek and its tributaries were in good condition within the study area. Little erosion was observed along the creekline and little accumulated sediment was noted in the channels. The edge effect of urban development alongside lower reaches of Byles Creek was evident, in that where properties were in close proximity to the watercourse itself, the creek was fringed by predominantly exotic species. The riparian vegetation adjacent to the Byles Creek tributary below the eastern end of Azalea Grove was in good condition, although the vegetation along the road edges and property boundaries was in poor condition and dominated by exotic shrubs and vines.

These observations highlight the importance of maintaining a vegetated buffer between residential development and watercourses within Byles Creek catchment. The Natural Resources Access Regulator (NRAR) recommends riparian corridor widths based on Strahler order of watercourses. These have been mapped for Byles Creek in Figure 4.

While the need for a Controlled Activity Approval (CAA) is not applicable for single dwelling and dual occupancies (see Table 1), the principles of the *Guidelines for controlled activities on waterfront land* (NRAR, 2018) should still be applied in order to protect the Byles Creek catchment. This includes maintaining vegetated buffers between future residential developments and Byles Creek.

Figure 5: Byles Creek tributary near end of Azalea Grove, looking upstream

Figure 6: Byles Creek tributary near end of Azalea Grove, looking downstream

Figure 7: Byles Creek below Angophora Place, looking upstream

Figure 8: Byles Creek below Angophora Place, looking downstream

Figure 9: Third order Byles Creek behind Malton Road, looking upstream

Figure 10: Third order Byles Creek behind Malton Road, looking downstream

5. Water Quality Analysis

5.1. Methodology

Water quality data from Hornsby Shire Council's water quality monitoring program was reviewed to determine the likely water quality of the Byles Creek study area and compare the water quality of the study area with nearby catchments with similar characteristics.

Observations of water quality and potential point source and non-point source pollution sources were also noted during the site inspection on 31 March 2021.

5.2. Results and Discussion

Hornsby Council does not have an existing water quality monitoring point within the study area, however there is a water quality monitoring point known as Site 147, located downstream of the study area on a tributary of Byles Creek within Lane Cove National Park.

Data from this site was compared with data collected at Georges Creek and Pyes Creek sites, which are sites representative of waterways influenced primarily by urban land-use. The average Total Nitrogen at Pyes Creek from January 1995 to September 2017 was 0.926 mg/L and for the same period at Georges Creek was 0.743 mg/L. In comparison, at Site 147, the average Total Nitrogen level between December 2010 and September 2020 was 0.166 mg/L.

Faecal coliform levels at Georges Creek were on average 8504 CFU/100ml and 2283 CFU/100ml at Pyes Creek. In comparison, the level at Site 147 was 140 CFU/100ml.

From these comparisons it could be inferred that the greater amount of urban development in the Georges and Pyes Creek catchments has contributed to the poor water quality at these sites, and that future development within the Byles Creek catchment may lead to the same degradation of water quality.

It was also notes that sources of pollution and additional nutrients were observed during the site inspection and are shown in Figure 11, Figure 12 and Figure 13. Regular maintenance of GPT's and street sweeping regimes could prevent these items from entering the waterways.

Figure 11: Full gross pollutant trap below Britannia Street

Figure 12: Leaf litter entering stormwater drain on Malton Road

Figure 13: Litter deposited in riparian zone of Byles Creek below Angophora Place

6. Soil Landscapes

6.1. Methodology

A review of DPIE's eSpade website was undertaken to determine the soil landscapes present within the study area.

6.2. Soil landscape Map

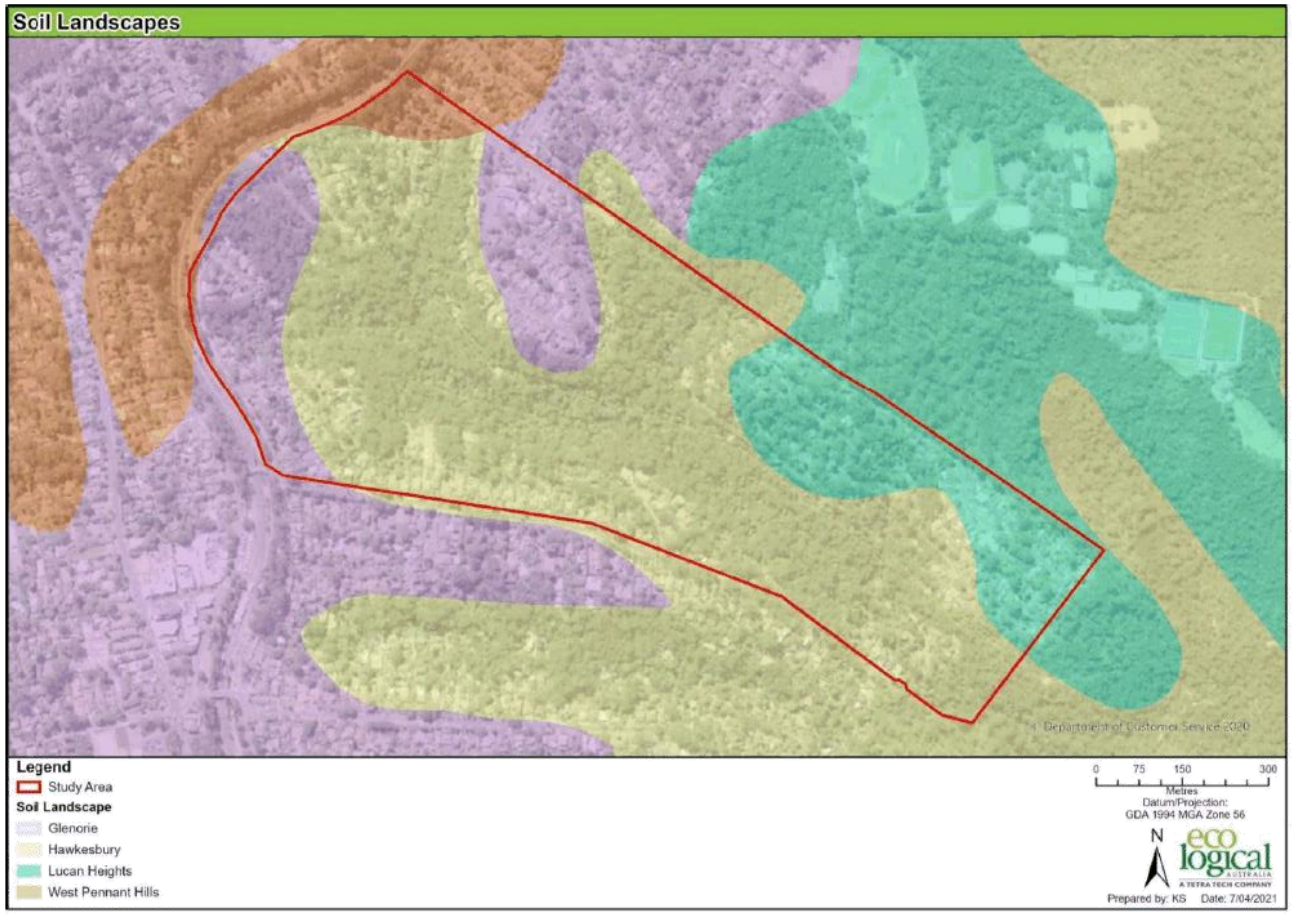

Figure 14: Soil landscapes within the study area

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6.3. Results and Discussion

The soil landscapes identified within the study area are shown in Figure 14 and a description of each of these is included in Table 2. This is an extract from Chapman G.A. and Murphy C.L., 1989, *Soil Landscapes of the Sydney 1:100,000 Sheet* report, Soil Conservation Service of NSW, Sydney. A soil landscape is an area of land with a common suite of soil types and landscape attributes. Soil landscape mapping also provides an overview of soil and/or landscape limitations for land use practices, and an assessment of both urban and rural land capabilities.

Table 2: Soil landscapes within study area

Landscape	Geology	Soils	Erosion Hazard
Hawkesbury-Colluvial			
Rugged, rolling to very steep hills on Hawkesbury Sandstone. Local relief 40–200 m, slopes >25%. Rock outcrop >50%. Narrow crests and ridges, narrow incised valleys, steep sideslopes with rocky benches, broken scarps and boulders. Mostly uncleared eucalypt open woodland (dry sclerophyll forest) and tall open-forest (wet sclerophyll forest).	Hawkesbury Sandstone consisting of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Sandstones are either massive or cross-bedded sheet facies with vertical or subvertical joint sets. The combination of bedding planes and widely spaced joints gives sandstone outcrops a distinctive blocky appearance.	Colour varies from brownish-black when abundant organic matter is present, to dull yellow orange. Colour often becomes lighter with depth. The pH ranges from strongly acid (pH 4.0) to slightly acid (pH 6.0). Weakly weathered sandstone fragments may be present whilst charcoal fragments and roots are common. This material is commonly water repellent.	Erosion hazard for non-concentrated flows is generally very high and ranges from moderate to extreme. The calculated soil loss for the first twelve months of urban development ranges up to 109 t/ha for topsoil and 394 t/ha for subsoil. The soil erosion hazard for concentrated flows is extreme.
Lucas Heights – Residual			
gently undulating crests and ridges on plateau surfaces of the Mittagong formation (alternating bands of shale and fine-grained sandstones). Local relief to 30 m, slopes	Mittagong Formation–interbedded shale, laminite and fine to medium grained quartz sandstone. The Mittagong Formation is located stratigraphically between the Ashfield Shale and Hawkesbury Sandstone. It is often relatively shallow. Minor areas of Hawkesbury Sandstone and minor areas of Ashfield Shale may occur.	Moderately deep (50–150 cm), hardsetting Yellow Podzolic Soils and Yellow Soloths (Dy2.41); Yellow Earths (Gn2.24) on outer edges.	The erosion hazard for non-concentrated flows is generally moderate, but ranges from slight to extreme. Calculated soil loss during the first twelve months of development ranges up to 103 t/ha for topsoil, and 97 t/ha for exposed subsoil. Soil erosion hazard for concentrated flows is high.
Glenorie - Erosional			
Undulating to rolling low hills on Wianamatta Group shales. Local relief 50–80 m, slopes 5–20%. Narrow ridges, hillcrests and valleys. Extensively cleared tall open-forest (wet sclerophyll forests).	This soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. 71 The Ashfield Shale is comprised of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone,	Shallow to moderately deep (<100 cm) Red Podzolic Soils (Dr2.11) on crests; moderately deep (70–150 cm) Red and Brown Podzolic Soils (Dr2.11, Dr2.21, Db1.11, Db1.21) on upper slopes;	The erosion hazard for non-concentrated flows ranges from moderate to very high. Calculated soil loss for the first twelve months of urban development ranges up to 65 t/ha for topsoil and 117 t/ha for exposed subsoil.

Landscape	Geology	Soils	Erosion Hazard
	laminite, fine to medium grained lithic-quartz sandstone	deep (>200 cm) Yellow Podzolic Soils (Dy5.11) and Gleyed Podzolic Soils (Dg4.11) along drainage lines.	The soil erosion hazard for concentrated flows is high.
West Pennant Hills - Colluvial			
rolling to steep sideslopes on Wianamatta Group shales and shale colluvium. Local relief 40–100 m, slopes >20%. Partially cleared, tall, open-forest (wet sclerophyll).	Wianamatta Group. Ashfield Shale formation-laminite and dark grey shale. Bringelly Shale-shale, calcareous claystone, laminite, fine to medium grained lithic quartz sandstone (Herbert, 1983).	deep (>200 cm) Red and Brown Podzolic Soils (Dr2.11, Dr3.11, Db1.11) on upper and midslopes; Yellow and Brown Podzolic Soils My 4.11, Dy5.11, Db1.11) on colluvial benches; Yellow Podzolic Soils (Dy3.11) and Gleyed Podzolic Soils (Dg4.11) in drainage lines and poorly drained areas.	Because slopes are steep the erosion hazard for non-concentrated flows is high to extreme. Calculated soil loss for the first twelve months of urban development ranges up to 219 t/ha of topsoil and 372 t/ha for exposed subsoil. The erosion hazard for concentrated flows is very high to extreme.

Soil landscape summaries for the study area identify that the erosion hazards for non-concentrated flows range from moderate to very high and for concentrated flows from high to extreme. This has constraints on future development in regard to stormwater disposal off site, discharged towards Byles Creek and its tributaries, which has the potential to easily erode the slopes leading down to the watercourses at the bottom of the gullies. Erosion of the slopes above the watercourses can lead to sedimentation and degradation of water quality within downstream environments including Lane Cove National Park.

7. Ecological Assessment

7.1. Methodology

7.1.1. Literature and database review

A review of the following relevant data, background literature on the study area and locality, and relevant planning instruments and strategic documents was undertaken:

- Aerial photographs (Google Earth, SIXMaps)
- Atlas of NSW Wildlife (Department of Planning, Industry and Environment (DPIE) 2021)
- Biodiversity Values Map (NSW Government) (Accessed 21 March 2021)
- Commonwealth EPBC Act Protected Matters Search Tool (DAWE 2021)
- Threatened species profiles (OEH 2021)
- Hornsby Local Environment Plan 2013 (LEP 2013)
- Hornsby Development Control Plan 2012 (DCP 2013)
- Hornsby Council Natural Heritage Register (LEP 2013)
- Office of Environment and Heritage (OEH – now DPIE) Sydney Metro mapping (2016)
- Native Vegetation Communities of the Hornsby Shire and Mapping (Smith and Smith 2008, ELA 2018)
- Soil Landscapes of Sydney 1:100 000 Sheet (Chapman and Murphy 1989).

The BioNet database (5 km radius) and Protected Matters Search Tool (5 km radius) searches were performed around the coordinates -33.7466, 151.0732 on 7 April 2021. The results of these searches were combined to produce a list of threatened species, populations and ecological communities considered likely to occur in, or utilise the study area. The likelihood of occurrence for each species, population and ecological community was determined using recent records, the likely presence of suitable habitat and knowledge of the species ecology.

The likely occurrence of each species was determined before the site inspection by reviewing records in the area, considering the habitat available and using expert knowledge on the ecology of each species. This was then reviewed and refined following the site inspection. The likelihood of occurrence for each species determined after the site inspection is provided in Appendix A.

Five terms for the likelihood of occurrence of species are used in this report, as defined below:

- "yes" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site, and
- "no" = habitat on site and in the vicinity, is unsuitable for the species.

7.1.2. Site Inspection

A site inspection was conducted by ELA ecologist Stacey Wilson on 31 March 2021. The weather conditions on this day were sunny with no winds with a maximum temperature of 24.3°C, minimum temperature of 13°C and no rainfall recorded (Weather Station 66124, BOM 2021).

The study area was traversed on foot and the survey focused on the following:

- Validate the extent and quality of vegetation within the study area and assignment to a best- fit Plant Community Type (PCT) in accordance with the NSW Government BioNet Vegetation Classification
- Identify the presence of threatened species/populations or whether potential habitat for these species/populations were likely to occur
- Identify any other significant habitat features such as hollow bearing trees, riparian areas and rocky outcrops.

Notes and photographs were taken during the site inspection.

7.1.3. Vegetation Communities

The random meander method (Cropper 1993) was used to confirm the boundaries of vegetation communities and species assemblages within the study area. Where the boundaries of vegetation communities differed from existing vegetation mapping, these were modified on hard copy maps and marked with a hand-held GPS.

7.1.4. Flora surveys

Preliminary flora surveys were conducted simultaneously while validating the vegetation communities. A list of potential threatened flora species likely to occur was identified during literature review. Field surveys focused on suitable habitat for threatened flora species. A list of opportunistic observations was also recorded.

7.1.5. Fauna Surveys

The presence of threatened fauna species identified as having the potential to occur in the study area was determined through a habitat assessment. Where threatened species or important habitat features were observed, their locations were marked using a hand-held GPS. However, the locations of important habitat features (e.g. rock outcrops, significant logs and location of all winter flowering eucalypts) observed were not recorded, but rather a qualitative assessment was conducted for each feature was conducted.

This assessment was not intended to provide an inventory of all species present across the study area but instead an overall assessment of the ecological values of the study area with a particular emphasis on threatened species, TECs and key fauna habitat features. It is important to note that some species may not have been detected on the site during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. In this case the likelihood of their occurrence on site has been assessed based on the presence of potential habitat.

7.2. Results and Discussion

7.2.1. Vegetation Communities

There were three vegetation communities present within Byles Creek. These include:

- Blue Gum Shale Forest
- Blackbutt Gully Forest
- Coachwood Rainforest.

The vegetation community naming in this report follows nomenclature in the Native Vegetation Communities in the Hornsby Shire (Smith and Smith 2008), and have been assigned to a Plant Community Type (PCT) shown in Table 3. Remnant tree canopy species were also present in front and back yards of private properties and are contain both remnant urban trees and plantings. Vegetation is shown in Figure 15 and Figure 16.

Table 3: Vegetation communities and Plant Community Types

Hornsby Vegetation Communities	Plant Community Types
Blue Gum Shale Forest	1237. Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion
Blackbutt Gully Forest	1181. Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion
Coachwood Rainforest	905. Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion

7.2.1.1. Blue Gum Shale Forest

At the north western end of the study area small areas of Blue Gum Shale Forest was present. The dominant canopy was *Eucalyptus saligna* (Blue Gum), with occasional *Angophora costata* (Sydney Red Gum) and *Eucalyptus paniculata* (Grey Ironbark). Understorey included small trees *Allocasuarina torulosa* (Forest Oak), with ground layer of *Adiantum aethiopicum, Lomandra longifolia* and *Plectranthus parviflorus*. Some examples of this community were present as remnant trees with little native undertorey.

7.2.1.2. Blackbutt Gully Forest

The majority of the study area was vegetated by Blackbutt Gully Forest with the dominant canopy species included *Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Smooth-barked Apple), *Syncarpia glomulifera* (Turpentine) and *Corymbia gummifera* (Red Bloodwood). Understorey included shrubs of *Banksia spinulosa, Xanthorrhoea arborea, Persoonia linearis.*

7.2.1.3. Coachwood Rainforest

Two areas within the creekline were vegetated by Coachwood Rainforest with dominant canopy of *Ceratopetalum apetalum*. Understorey included small trees of *Tristaniopsis laurina, Callicoma serratifolia*, sedges including *Gahnia clarkei,* ferns such as *Blechnum ambiguum, Sticherus flabellatus*, and vines including *Cissus hypoglauca. Morinda jasminoides and Smilax glyciphylla.* Weeds included *Ligustrum sinense and Ageratina riparia.*

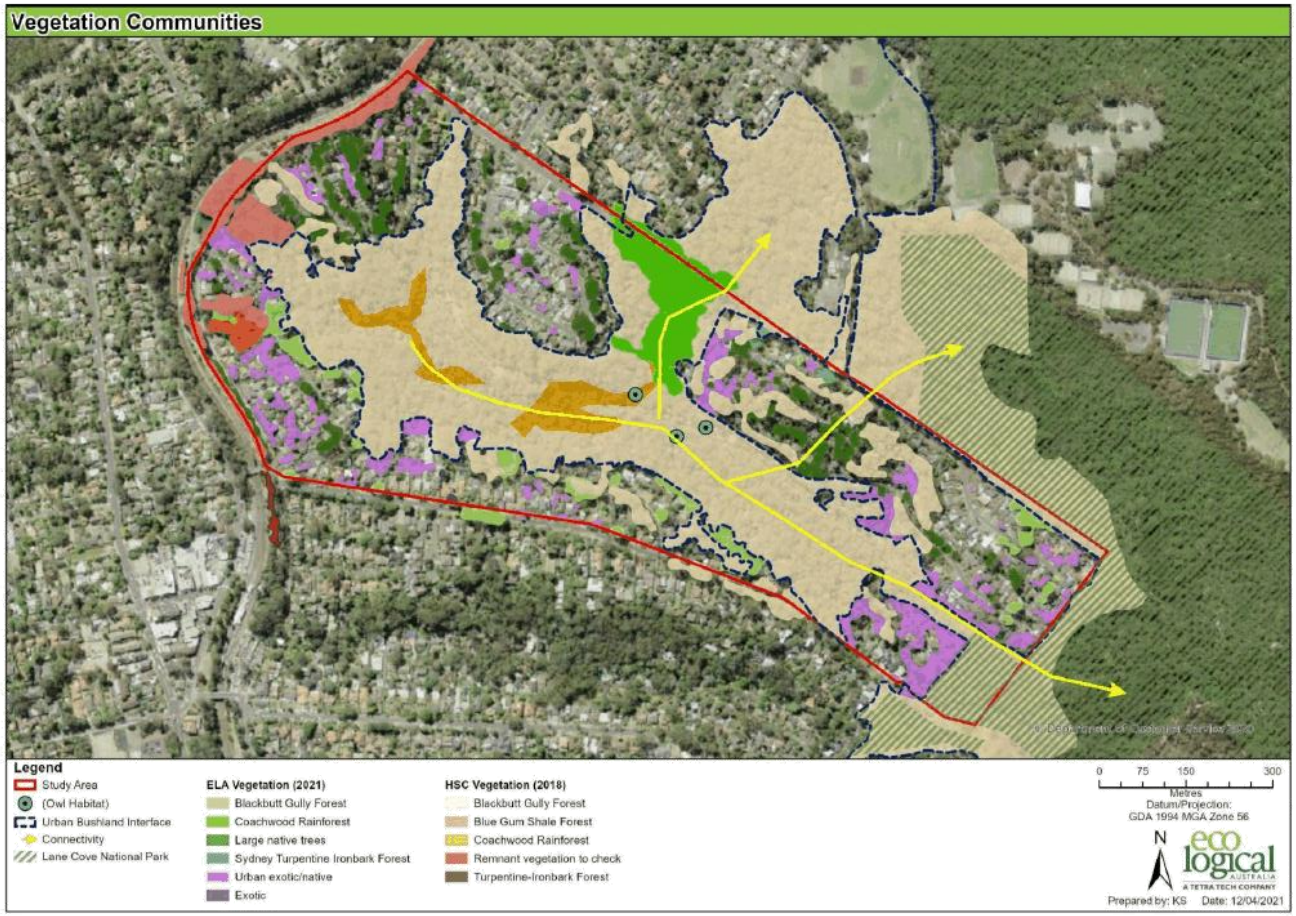

Figure 15: Vegetation communities, urban bushland interface and urban trees

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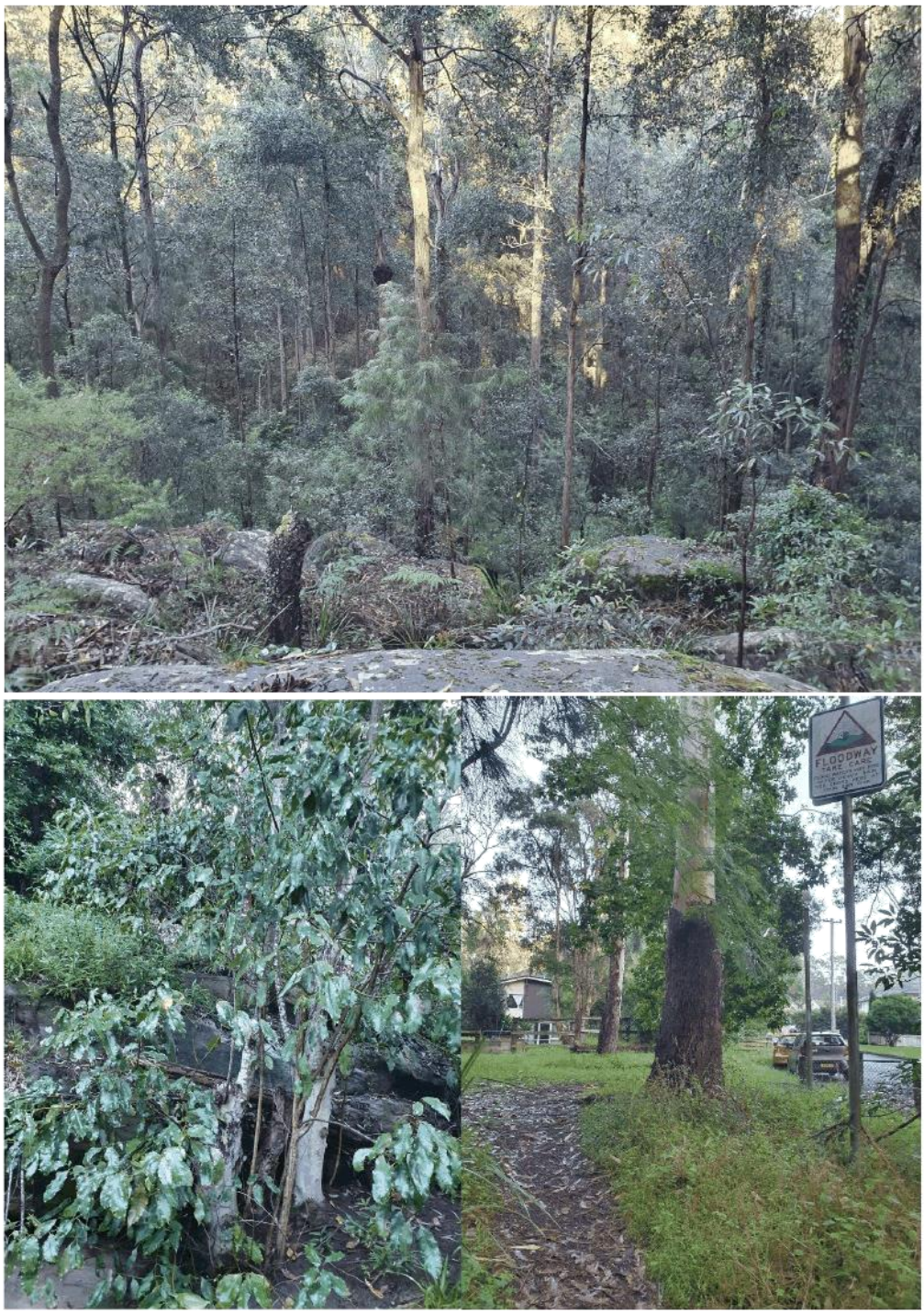

Figure 16: Blackbutt Gully Forest, Coachwood Rainforest and Blue Gum Shale Forest

7.2.2. Bushland Proximity

The study area has good connectivity to large areas of native vegetation in Lane Cove National Park being located immediately adjacent. The study area also has good connectivity to nearby Council managed bushland reserves in Britannia Street, Pennant Hills, and to the National Trust property 'Ahimsa' in Day Road, Cheltenham.

The interface between the urban and bushland areas has been mapped as shown in Figure 15. The interface is defined by mapping vegetation communities within the bushland area, and mapping remnant trees within the urban area.

7.2.3. Fauna species and habitats

Vegetation within the study area provides suitable habitat for a number of common peri-urban species and threatened fauna species. Habitat features were recorded within the study area and have been described below.

Table 4: Habitat features and associated fauna groups (guilds) recorded within the study area

Habitat Features	Guild	Presence in study area
Remnant vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	Present and extensive within Byles Creek corridor. Remnant canopy also present within private properties.
Winter flowering species	Winter migratory birds, arboreal mammals and megachiropteran bats (fruit bats)	Limited.
Hollow-bearing trees (HBT)	Birds and arboreal mammals (gliders and microbats)	Present, and ranging in size from small hollows able to support smaller species such as microbats to larger hollow dependant species such as owls.
Stags	Birds, particularly birds of prey, reptiles, amphibians, micro bats	Present and likely to provide habitat for larger hollow dependant species such as owls.
Leaf litter	Reptiles, amphibians, invertebrates	Abundant. Deep leaf litter is present across a large portion of the study area within Byles Creek corridor. Limited leaf litter within urban areas.
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Present, logs present within Byles Creek corridor.
Watercourses	Amphibians, reptiles, water birds and microbats	Present – ephemeral streams, 1st 2nd and 3rd order Strahler streams present within study area and is suitable habitat for threatened amphibian species.
Rocks/ rocky outcrops	Reptiles, invertebrates, terrestrial mammals	Abundant – rocky sandstone outcropping and large rocks abundant within Byles Creek corridor.
Vegetative corridor	Birds, reptiles, arboreal and small mammals	Present and extensive within Byles Creek corridor. Remnant canopy also present in front and back of private property. Canopy vegetation contains good connectivity through planted native and

Habitat Features	Guild	Presence in study area
		exotic canopy species within private property.
Mistletoe	Birds and arboreal mammals	Absent
Native/ Exotic grassland	Migratory wetland birds (Egrets), predator bird species (Little Eagle) and microbats	Limited

7.2.3.1. Hollow bearing trees

Hollow-bearing trees (HBTs) and stags are present and ranging in size from small hollows able to support smaller species such as non-threatened and threatened microbats to larger hollow dependant species such as owls and arboreal mammals.

7.2.3.2. Birds

Remnant and planted trees typically provide foraging, roosting and perching habitat for a number of larger bird species. HBT's provide roosting habitat for hollow-dependant bird species and are often in limited supply in fragmented habitats. Within the Byles Creek corridor there is an abundance of hollows in varying sizes. A number of large sized hollows, which could support threatened owls were noted within the study area.

7.2.3.3. Arboreal Mammals (Not including bats)

There is an abundance of nectar producing Eucalyptus and Banksia species present within the study area. The nectar producing species are suitable foraging habitat for non-threatened arboreal mammal species such as *Pseudocheirus peregrinus* (Common Ringtail Possum) and *Trichosurus vulpecula* (Common Brushtail Possum).

7.2.3.4. Bats (Microchiropteran Bats and Megabats)

Threatened and non-threatened tree-roosting microbats may utilise small hollows in trees for temporary diurnal shelter, and potentially as roosting habitat, although there were no obvious potential roost sites identified during the field survey. A detailed survey would be required identify potential roosting sites for microbats.

7.2.3.5. Reptiles

Fallen logs and rocks which provide basking habitat for reptile species were abundant within the study area. No BioNet Wildlife Atlas records for threatened reptiles have been recorded within 5 km of the study area.

7.2.3.6. Amphibians

The study area contains ephemeral streams, 1st 2nd and 3rd order Strahler streams within the study area. Deep leaf litter and rocks are present along the banks of the streams. The streams are suitable habitat for amphibians including threatened species.

7.2.4. Threatened species, endangered populations and ecological communities

7.2.4.1. Threatened flora

The vegetation within the Byles Creek corridor contains suitable habitat for 30 threatened flora species identified by BioNet Wildlife Atlas records within a 5 km radius of the study area. There are several records of threatened flora species within or in close proximity to the study area including:

- *Darwinia biflora*
- *Genoplesium baueri*
- *Leptospermum deanei*
- *Tetratheca glandulosa.*

7.2.4.2. Threatened fauna

The Byles Creek corridor contains suitable habitat for 30 threatened flora species identified by BioNet Wildlife Atlas records within a 5 km radius of the study area. There are several records of threatened fauna species within or near the study area including:

- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Miniopterus australis* (Little Bent-winged Bat)
- *Ninox strenua* (Powerful Owl)
- *Pseudophryne australis* (Red-crowned Toadlet)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

7.2.4.3. Endangered population

The Byles Creek corridor contains habitat for the listed Gang-gang Cockatoo endangered population in the Hornsby and Ku-ring-gai Local Government Areas.

7.2.4.4. Threatened ecological communities

Blue Gum High Forest in the Sydney Basin Bioregion is listed as Critically Endangered in NSW under the BC Act and in Australia under the EPBC Act. The Byles Creek study area does not meet the condition criteria under the EPBC Act as the area is too small.

7.2.5. Habitat Requirements.

7.2.5.1. Powerful Owl

BioNet records over 1000 sightings of *Ninox strenua* within a 5 km radius of Byles Creek since the 1980s. The species can breed and forage in very small patches of vegetation, although this is hugely variable across their range. They require nest trees in living or dead trees with hollows greater than 20 cm diameter. To ensure protection a circular buffer with a 100 m radius around the known nest tree/s m forms a polygon for the species protection for Development Applications or Biodiversity Stewardship sites within the area essential for breeding, and includes habitat suitable for male roosts, feeding/grooming perches and fledgling requirements. This is in addition to foraging habitat (Threatened Biodiversity Database Collection (TBDC), EES 2021). .

There is competition for urban tree hollows due to their scarcity, with Sulphur-crested Cockatoos taking over owl nesting hollows within one day of a failed breeding (Birdlife Australia, Sydney Powerful Owl Project (POP) 2020). Retention of hollow-bearing trees is critically important to the species survival in urban areas. They also found a high mortality of young fledglings, coupled with the increase in single

chick fledglings, impacting on recruitment of young into the population. The project also recorded 75% of the mortalities of adult birds in 2019 was due to roadkill. They discuss the selective removal of large and small hollow-bearing trees from the urban space, often without any assessment of how important these hollows are to urban wildlife, because they are considered "ugly" or dangerous. This is compounded by significant hollow-loss following the NSW 2109/2020 fires.

The POP is investigating effective artificial hollows to promote the survival of urban Powerful Owls in areas where hollows have been lost, through trials measuring temperature and humidity in known owl nest trees and in insulated nest boxes, to allow for successful egg development. Initial results suggest that with correct design, artificial nest boxes can act thermally like natural tree hollows.

The project has also focused on corridors for dispersing juvenile owls, where they can move through existing territories until they can establish a territory, using conservation genetics to monitor movement through citizen scientists undertaking monitoring during March to May.

Other human activities that impact on Powerful Owl include the use of second generation rodenticides where they eat rats and mice that have ingested poison, as well as human visitors near nest sites causing the loss of fledglings.

7.2.5.2. Gang-gang Cockatoo

In 2001 the population was listed as endangered by the NSW Scientific Committee which found that the numbers of the Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas have been reduced to such a critical level, and its habitat has been so drastically reduced, that it is in immediate danger of extinction. The small population was the last known breeding population in the Sydney Metropolitan area, estimated at that time to be between 18 - 40 pairs.

BioNet Atlas numbers reveal a drastic population decline since 2010, with annual sighting numbers of individuals ranging from 40-126 from 1980-2009, and to 2-3 since 2010. (Figure 17).

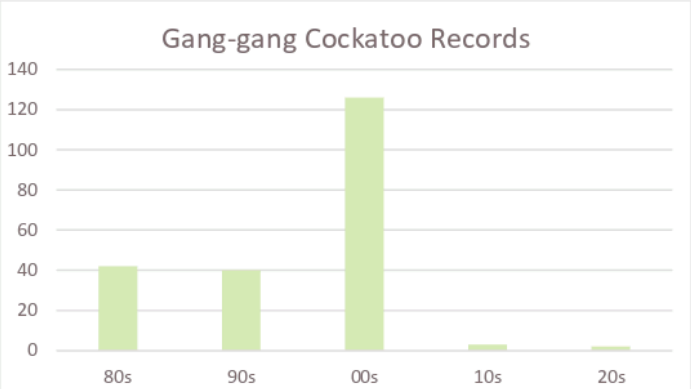

Figure 17: Gang-gang Cockatoo records within 5 km of Byles Creek

The species and population is dependent on the retention of potential nest trees which are forest and woodland eucalypts containing hollows that are at least 9 m above the ground; and contain hollows with a diameter of 10 cm or larger. A species polygon for a breeding pair includes a buffer with a radius of 200 m around each nest tree, being the essential area for breeding and minimise disturbance/avoid

clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. This may be a linear shape if the vegetation is linear, and the nest tree is already located near the edge of the wooded area (TBDC, EES 2021). The high level of biodiversity concern includes that as a species dependent on habitat attributes, has a high sensitivity to loss and a high sensitivity to gain.

Saving our Species program (OEH, 2021) currently has no key management sites for conservation of the endangered population. It recommends the following actions:

- Develop fire management options within forested habitat areas that give priority to minimising loss of habitat trees
- Produce a community awareness strategy that provides advice on how to carry out actions that will benefit the population of the species
- Provide supplementary hollows/nest boxes within the primary habitat areas
- Develop a strategy that includes street tree or other planting, browse plant species within reserves and private residences
- Monitor utilisation of the relevant forested areas as to nesting, foraging and other habitat uses
- Investigate movement patterns within and between areas occupied by individuals from the population
- Determine from study findings whether opportunities exist to further facilitate migrations to and from the designated endangered population area
- Provide map of known occurrences to Rural Fire Service and seek inclusion of mitigative measures on Bush Fire Risk Management Plan(s), risk register and/or operation map(s).

7.2.5.3. Bats (microchiropteran bats and Megabats)

The vegetation within the study area is likely to be used as foraging habitat for threatened for microbat species; threatened microbat species may also forage along the 1st 2nd and 3rd order Strahler stream identified within the study area

Threatened microbat species listed under the BC Act and/or EPBC Act which are likely to forage within he study area and have been recorded from the BioNet Wildlife Atlas search include; *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat), *Miniopterus australis* (Little Bent-winged Bat), *Myotis macropus* (Southern Myotis), *Scoteanax rueppellii* (Greater Broad-nosed Bat), *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat).

The study area is likely to be used seasonally by *Pteropus poliocephalus* (Grey-headed Flying-fox) to forage on fruiting and flowering trees including the exotic and planted trees across the study area. The study area does not contain a camp site for Grey-headed Flying-fox. The nearest Grey-headed Flying fox camp to the study area is the Nationally Important Gordon park camp located 8 km to the east of the study area (DAWE 2020).

7.2.5.4. Koala

There are 6 BioNet Wildlife Atlas records for Koala recorded within a 5 km radius of the study area. Koala is listed as a Vulnerable species under the BC Act and EPBC Act. Hornsby local government area is included within the State Environmental Planning Policy (Koala Habitat Protection) 2021.

The records have been recorded within the last 8 years (between 2012-2018). There is foraging habitat for Koala within the study area within the vegetated corridor and within private properties. A number of Koala feed tree species were noted during the field survey and include but are not limited to; *Allocasuarina torulosa* (Forest Oak), *Angophora costata* (Smooth-barked Apple) *Corymbia gummifera* (Red Bloodwood) *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine) were recorded within the study area. These species are listed on Schedule 2, Central Coast koala management area of the *State Environmental Planning Policy (Koala Habitat Protection) 2021*. There are very likely to be additional Koala feed tree species, listed within Schedule 2 present within the study area, following further field investigations.

7.2.5.5. Amphibians

The study area contains ephemeral streams, 1st 2nd and 3rd order Strahler streams within the study area. Deep leaf litter and rocks are present along the banks of the streams. The streams are suitable habitat for amphibians; including threatened amphibian species listed under the BC Act and/or EPBC Act; *Pseudophryne australis* (Red-crowned Toadlet) and *Heleioporus australiacus* (Giant Burrowing Frog). There are 22 BioNet Wildlife Atlas records for Red-crowned Toadlet within a 5 km radius of the study area. There are also 2 records for Giant Burrowing Frog within a 5 km radius of the study area.

There are also 7 BioNet Wildlife Atlas records for *Litoria aurea* (Green and Golden Bell Frog) within a 5 km of the study area. Further field survey would be required to identify if potential habitat for this species (i.e. standing water bodies water with native fringing vegetation) is present within the study area.

7.2.5.6. Invertebrates

Pommerhelix duralensis (Dural Land Snail) has been recorded within a 5 km radius of the study area. Dural Land Snail favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris (Ridgeway et al., 2014). Dural Land Snail is listed as Endangered under the BC Act and EPBC Act.

There is good quality habitat for this species within the Byles Creek corridor. The species is a shale influenced habitat specialist. The soils within the study area contain a contain a shale-sandstone influence and deep leaf litter at the base of large remnant trees and rocks which are favoured for sheltering are abundant within the Byles Creek corridor.

The Dural land snail occurs on both public and private land (Commonwealth Conservation Advice *Pommerhelix duralensis* (Dural land snail), 2015). There may be potential habitat for Dural Land Snail present within the leaf litter at the base of remnant and planted native canopy species within private properties in the study area. However, habitat for this species is less likely to be utilised as the habitat has been historically modified for development of residential housing and is disturbed through on-going maintenance through sweeping of leaves, mowing lawns and is less likely to be used as habitat for this species in comparison to the better quality habitat within the study area (i.e. the habitat within the Byles Creek corridor).

7.2.6. Ecological Constraints

7.2.6.1. Summary of Ecological Values

The significant biodiversity values on and in close vicinity to the site are:

- Critically Endangered Ecological Community Blue Gum High Forest
- Regionally significant Coachwood Rainforest
- Locally significant Blackbutt Gully Forest
- Connectivity to Lane Cove National Park (LCNP)
- Habitat for threatened fauna including Powerful Owl, Gang-Gang Cockatoo, Red-crowned Toadlet, Little Bent-winged Bat and microbats
- Gang-gang Cockatoo endangered population in the Hornsby and Ku-ring-gai Local Government Areas
- Habitat for threatened flora including *Darwinia biflora, Genoplesium baueri, Leptospermum deanei* and *Tetratheca glandulosa*.

The potential ecological values associated with the study area are described below and constraints are mapped in Figure 18.

7.2.6.2. High ecological values:

This includes all the significant biodiversity values. Direct (removal of vegetation) and indirect impacts to these areas may trigger a likely significant impact under section 7.3 of the BC Act 2016 requiring the preparation of a Biodiversity Development Assessment Report and the concurrence of OEH for approval

7.2.6.3. Medium ecological values:

This includes the remnant urban trees. Changes to the remnant urban canopy can result in the loss of biodiversity values including their habitat value for urban wildlife, as part of corridor linkages and genetic values.

7.2.6.4. Low ecological values:

This includes the urban developed land and exotic garden as well as disturbed, weedy vegetation.

7.2.7. Biodiversity Conservation Act 2016

In November 2016, the NSW parliament passed the *Biodiversity Conservation Act 2016* (BC Act). This new legislation replaced the *Threatened Species Conservation Act 1995* (TSC Act) and took effect 25 August 2017. Among other things, the BC Act introduces requirements for biodiversity assessment and requires proponents to offset certain biodiversity impacts through the purchase and retirement of biodiversity credits. For developments under Part 4 of the EP&A Act, the Biodiversity Offsets Scheme (BOS) and Biodiversity Assessment Method (BAM), requiring the preparation of a Biodiversity Development Assessment Report (BDAR), that may be triggered by the following means:

- Biodiversity Values Map
- Clearing threshold
- Significant impact to biodiversity values.

Figure 18: Ecological constraints within the study area

7.2.7.1. Biodiversity Values Map

Development on land mapped on the NSW Government Biodiversity Values Map will trigger the Biodiversity Offsets Scheme (BOS) under the NSW BC Act shown in Figure 19.

7.2.7.2. Clearing Threshold

Development that clears native vegetation that exceeds the area threshold associated with the minimum lot size for the property (Table 5) and will trigger the BOS.

Table 5 Clearing area threshold

Minimum lot size associated with the property (if no minimum lot size, actual lot size applies)	Threshold for clearing native vegetation, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

7.2.7.3. Test of significance

For developments within the study area, the impacts to threatened species and threatened ecological communities listed under Section 7.3 of the BC Act are required to be assessed in accordance with Section 7.3 of the BC Act, known as 'test of significance' (also known as a 5-part test).

The 5-part test is used to determine if the development is likely to have a significant impact on any threatened species, population or ecological community. If a significant impact is indicated by the 5-part test, then the proposal would trigger the BOS and a BAM assessment is required by preparing a BDAR.

7.2.7.4. Key Threatening Processes

Several Key Threatening Processes (KTPs) listed under the BC Act and / or EPBC Act are likely to be relevant to development within the study area. The most relevant KTPs are:

- Clearing of native vegetation (BC Act) / Land clearance (EPBC Act)
- Loss of Hollow-bearing Trees
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants Invasion, establishment and spread of Lantana (*Lantana camara*)
- Removal of dead wood and dead trees).

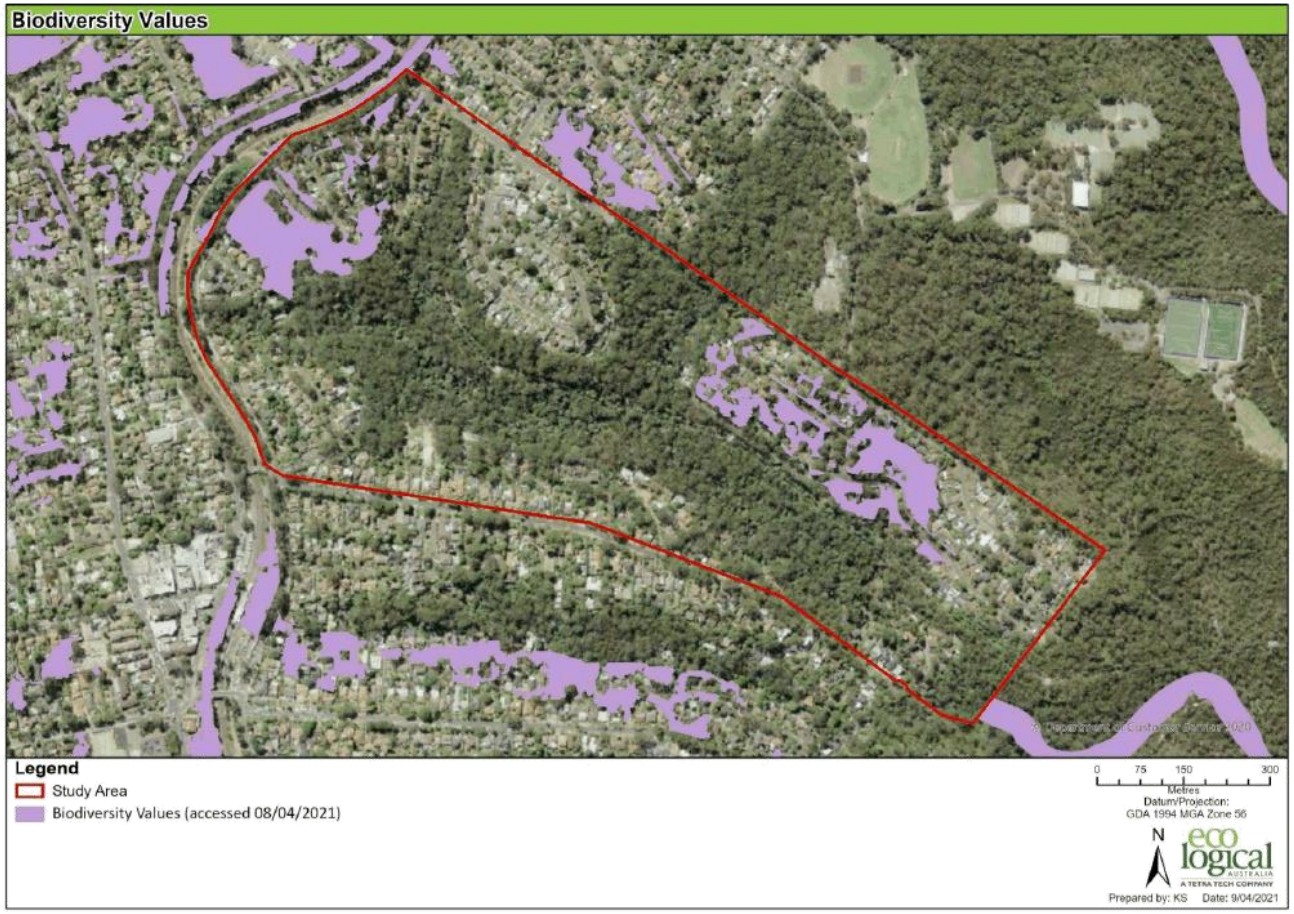

Figure 19: NSW Biodiversity Values Map

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7.2.8. Significance assessment (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where 'Matters of National Environmental Significance' (MNES) may be affected. Under the Act any action which "has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of the Environment and Energy (DotEE) which is responsible for administering the EPBC Act. A planning proposal is not considered an action.

The process includes conducting a significant impact criteria assessment for listed threatened species and ecological communities that represent a MNES and may be impacted as a result of the proposed action. Significant impact guidelines (DAWE 2013) have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and to outline criteria to determine whether or not a referral to the Commonwealth is required.

Some proposed developments within the study area may be required to assess MNES under the EPBC Act Significance Assessment.

7.2.9. State Environmental Planning Policies

7.2.9.1. State Environmental Planning Policy (SEPP) 19 – Bushland in Urban Areas

Its general aim is to protect and preserve bushland within the urban areas because of:

- *its value to the community as part of the natural heritage,*
- *its aesthetic value, and*
- *its value as a recreational, educational and scientific resource.*

For development on land adjoining land zoned or reserved for public open space, development by a public authority or development consent must take into account:

- *the need to retain any bushland on the land,*
- *the effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland, and*
- *any other matters which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.*

7.2.9.2. SEPP (Koala Habitat Protection) 2021

Koala SEPP 2021 commenced 17 March 2021 and applies to all land use zones within the Hornsby local government area. The principles of the Koala SEPP 2021 are to help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process, and to provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

Where there is no approved koala plan of management for land, the SEPP applies if the land ownership has an area of at least 1 hectare (including adjoining land within the same ownership). Before a council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on koalas or koala habitat. Development consent can be granted if Council is satisfied that the development is likely to have low or

no impact on koalas or koala habitat. If the development is likely to have a higher level of impact on koalas or koala habitat, a koala assessment report must be considered as part of a development application. Despite the above, Council may grant development consent if the site does not include any trees belonging to the koala use tree species listed in Schedule 2 for the relevant koala management area, or the site is not core koala habitat, or tree diameters are 10 cm or less, or includes only horticultural or agricultural plantations.

Under the SEPP core koala habitat means—

- *an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*
- *(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.*

7.2.10. Hornsby LEP 2013

7.2.10.1. Terrestrial Biodiversity

The land within the study area that is zoned RE1 is mapped on the Terrestrial Biodiversity map. Section 6.4 Terrestrial biodiversity of the Hornsby LEP 2013 applies to the land on the map. Its objectives are to maintain terrestrial biodiversity by—

- *protecting native fauna and flora, and*
- *protecting the ecological processes necessary for their continued existence, and*
- *encouraging the conservation and recovery of native fauna and flora and their habitats.*

When determining a DA, a consent authority must consider whether the development is likely to have—

- *any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and*
- *any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and*
- any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
- *any adverse impact on the habitat elements providing connectivity on the land, and*
- *any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.*

Development consent must not be granted to the development unless the consent authority is satisfied that:

- *the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or*
- *if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or*
- *if that impact cannot be minimised—the development will be managed to mitigate that impact.*

7.2.10.2. Schedule 5 Environmental Heritage

Clause 5.10 of the Hornsby LEP requires a DA to undertake a heritage assessment for items included within Schedule 5 Environmental Heritage. Several items are listed as Environmental Heritage within the study area (Table 6) and shown on the Heritage Map.

Table 6: Environmental heritage items within the Study Area

Suburb	Item name	Address	Property description	Significance	Item no
Beecroft	Street trees and bushland	Malton Road	Road reserve	Local	114
Beecroft	Bushland Reserve	Sutherland Road and Park Avenue—Byles Creek Valley	Lot 3, DP 540850; Lot 14, DP 562351; Lot 3, DP 530227; Lot 15, DP 237044; Lot 80, DP 1150971; Lot 23, DP 614741; Lot 6, DP 229639; Lot 204, DP 806307	Local	140
Beecroft	Conservation Area General				

7.2.11. Hornsby Development Control Plan (DCP) 2013

The Hornsby DCP references that the objectives of the Hornsby Shire Biodiversity Conservation Strategy (2006) include *to achieve an improvement in the quality and extent of existing indigenous vegetation in Hornsby Shire, maintain biodiversity on private properties, and to conserve and recreate biodiversity connectivity across fragmented landscapes*.

It contains provisions for the protection of trees under Clause 1B.6.1 Tree Preservation Prescribed Trees-

The prescribed trees that are protected by the Vegetation SEPP and/or Clause 5.10 of the HLEP and this Section of the DCP includes:

- *trees except exempt tree species in Hornsby Shire, as listed in Table 1B.6 (a) or subject to the Biodiversity Offset Scheme,*
- *all trees on land within a heritage conservation area described within the HLEP, and*
- *all trees on land comprising heritage items listed within the HLEP.*

Council permission must be obtained for removal of prescribed trees, except for exempt trees. It requires trees to be assessed using arboricultural, ecological and industry accepted safety evaluation methods to determine the safe useful life expectancy of the trees.

Clause 1B.6.2 Vegetation Preservation prohibits damage or removal of native vegetation except for clearing of 10 m^2 vegetation on urban land once every 5 years. Within the study area, this exemption does not apply to:

- *land located within 50 metres of and including land identified as "Terrestrial Biodiversity" on the Terrestrial Biodiversity Map in HLEP,*
- *land located within 50 metres of and including land that contains native vegetation which is habitat or potential habitat for species, populations or ecological communities listed in Schedule 1 and 2 of the Biodiversity Conservation Act 2016 and protected matters listed under the Commonwealth EPBC Act 1999.*

Clause 1C.1.1 Biodiversity includes desired outcomes:

- *Development that provides for the conservation of biodiversity including threatened species and populations, endangered ecological communities, remnant indigenous trees, regionally and locally significant terrestial and aquatic vegetation.*
- *Development that maintains habitat for native wildlife and wildlife corridors to provide for the movement of fauna species.*

It contains general prescriptive measures whereby development should seek to:

- *avoid potential adverse impact on biodiversity,*
- *if that impact cannot be avoided, minimise that impact, or*
- *if the impact cannot be minimised, to mitigate the impact.*

It requires a flora and fauna assessment is required for development that may impact on land mapped as Biodiversity on the HLEP Terrestrial Biodiversity Map, or native vegetation which is habitat for threatened species, and development should avoid the fragmentation of existing native vegetation.

Development should seek to retain unique environmental features of the site including rock outcrops, wetlands and the like, watercourses, drainage lines and riparian land, groups of significant trees and vegetation, and mature hollow trees and other fauna habitat features on the site.

Development should incorporate and maintain a buffer zone to significant flora and fauna, which should not include buildings, structures and earthworks within the required buffer zone, shown in Table 7.

Table 7: Excerpt of Hornsby DCP 2013 - buffer zones to vegetation types

Significant Vegetation Type	Minimum Buffer Zone (metres)
Endangered ecological communities and regionally significant bushland (as mapped in the HLEP Terrestrial Biodiversity Map	20m
Wetland or saltmarsh plant communities	20m
Populations of threatened flora species, habitat for threatened species, locally significant bushland, groups of remnant indigenous trees	10m

8. Bushfire

8.1. Methodology

Analysis of the Byles Creek study area was undertaken in relation to bushfire constraints and included the following aspects:

- Review of bush fire prone land mapping (BFPL)
- Review of the bushfire hazard influencing the study area with regard to vegetation and slope; and
- Review of existing bushfire constraints mapping.

8.2. Maps

Figures 20 - 22 on the following pages display maps depicting BFPL, slope constraints related to greater than 18 degree slopes and existing constraints mapping (ELA, 2020).

Figure 20: Bush Fire Prone Land Mapping

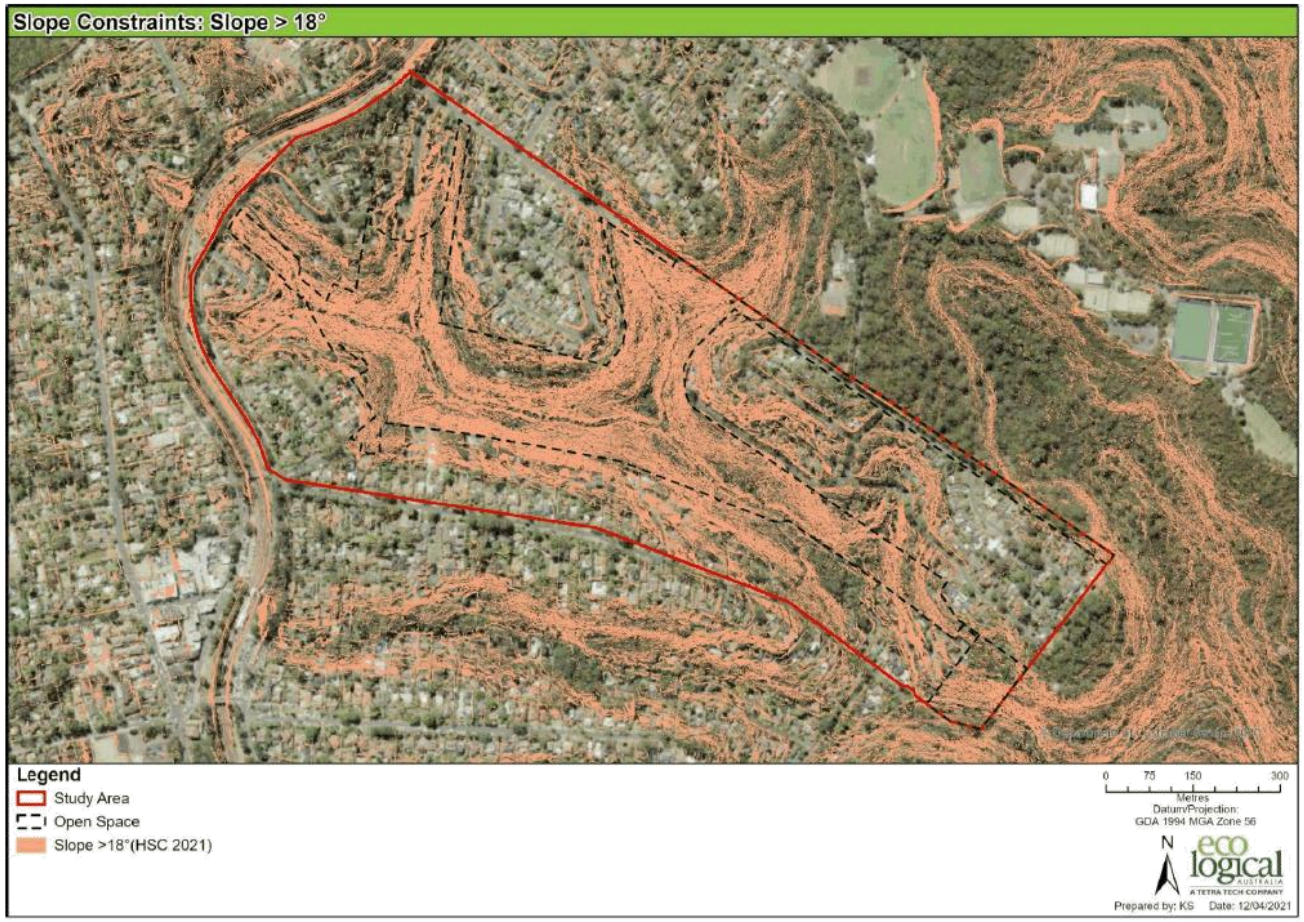

Figure 21:Slope constraints, areas >18 degrees

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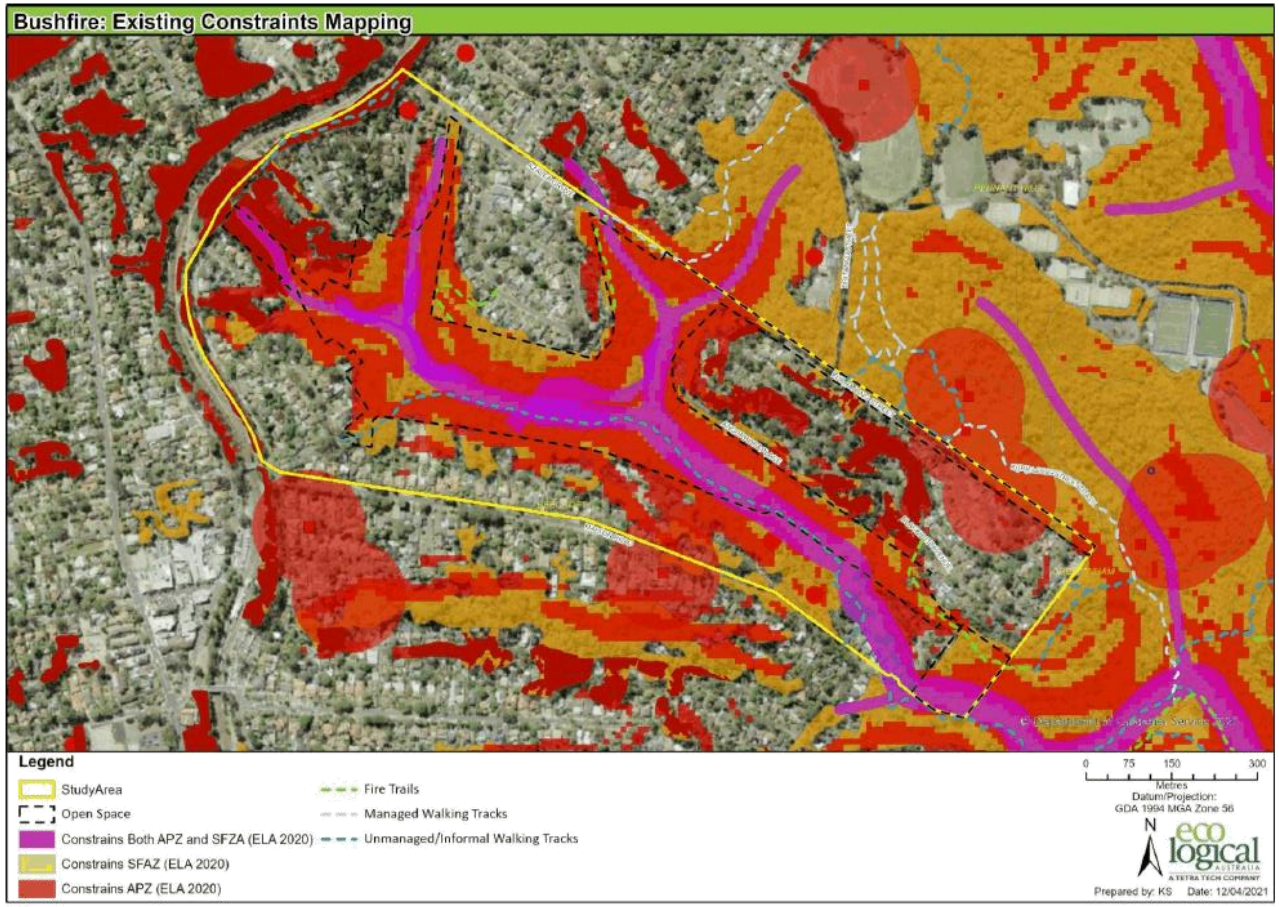

Figure 22: Existing bushfire constraints mapping (ELA, 2020)

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8.3. Results and Discussion

As described in the following sections, the Byles Creek study area is constrained by the presence of bush fire prone vegetation (BFPV) and the resulting requirements of Planning for Bushfire Protection (PBP) (RFS, 2019), as triggered by the *EP&A Act* for development on BFPL.

8.3.1. Review of Bush Fire Prone Land Mapping

Bush Fire Prone Land is certified by the NSW Rural Fire Service in accordance with legislative requirements and published by the Department of Planning, Industry and Environment. The presence of mapped BFPL within the study area, including the vegetation buffer, requires that any future development must satisfy the aim and objectives of PBP (RFS 2019). On formally mapped BFPL, an assessment is required to consider the vegetation hazard and effective slope within the site and adjoining areas, in order to determine the required site-specific bush fire protection measures in relation to any proposed development.

The core Byles Creek Open Space area (RE1 zone) is predominantly mapped as Vegetation Category 1, as shown is **Figure 20**. This is the highest BFPL category and corresponds to the highest bushfire risk (RFS, 2015), with Category 1 BFPV considered to have the highest likelihood of fully developed fires forming and is subject to a 100 m buffer. Much of the residential area surrounding the RE1 zones falls within the bushfire prone vegetation buffer.

8.3.2. Bushfire Hazard

A review of vegetation and slope applicable to the study area was undertaken.

Vegetation was validated on site by ELA ecologists, with Blackbutt Gully Forest, corresponding to *PCT 1181,* most prominent throughout the study area, particularly within the open space zone (Figure 15). Blue-Gum Shale Forest and Coachwood Rainforest are also mapped within the study area. Table 8 identifies the corresponding PBP vegetation formation for each mapped vegetation community.

Table 8: PBP vegetation formation for corresponding vegetation communities

Hornsby Vegetation Communities	Plant Community Types	PBP Vegetation Formation[1]
Blue Gum Shale Forest	1237. Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion	Forest
Blackbutt Gully Forest	1181. Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	Forest
Coachwood Rainforest	905. Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion	Rainforest

[1]As per A1.2 of PBP

Review of slope throughout the study area utilised a 20 cm slope raster derived from LiDAR and provided by HSC. The raster was classified into 5 degree increments (Figure 2), which demonstrates that much of the open space area and adjoining residential area is occupied by steep terrain, frequently greater than 20 degrees. A key constraint resulting from the steep terrain is the requirement for a performance assessment for where the effective slope impacting future development is greater than 20 degrees, as outlined in A1.4 of PBP.

Additional slope constraints include areas where slope is greater than 18 degrees (**Figure 21**). These areas present a key constraint for asset protection zones (APZs) as highlighted in section 3.2.2 of PBP. Generally, APZs on slopes greater than 18 degrees are not permitted due to difficulties associated with maintenance and reduced effectiveness (RFS 2019). For an APZ to be considered on land greater than 18 degrees, as per the requirements of PBP, a management plan must be established and approved via the DA process.

An overview of APZ requirements for residential and Special Fire Protection Purpose (SFPP) development, in accord with PBP and based on vegetation type and slope are tabulated in Table 9 below.

Table 9: Indicative residential APZ requirements for based on vegetation formation and slope class

Vegetation Formation	Slope Class	Residential APZ (BAL-29)[1]	SFPP APZ[2]
Forest	All upslope and flat	24 m	67 m
	0-5° downslope	29 m	79 m
	5 -10° downslope	36 m	93 m
	10-15° downslope	45 m	100 m
	15-20° downslope	56 m	100 m
Rainforest	All upslope and flat	11 m	38 m
	0-5° downslope	14 m	47 m
	5-10° downslope	18 m	57 m
	10-15° downslope	23 m	69 m
	15-20° downslope	30 m	81 m

[1]As per A1.12.2 of PBP for FDI100

8.3.3. Review of Bushfire Constraints Mapping

Review of existing constraints mapping developed by ELA as part of the Hornby Bushfire Risk Management Strategy (ELA, 2020) was also undertaken for this study. As shown in **Figure 22,** the study area is constrained in a number of locations with regard to the provision of APZ and Strategic Fire Advantage Zones (SFAZs). It is therefore unlikely that significant further bushfire management of the public land can be undertaken that would provide a bushfire protection outcome to existing or any future development on adjoining private land as the ecological value of the public land, coupled with the slope, mean the ability to provide APZs and SFAZ areas compliant with RFS guidelines is limited.

8.3.4 Overview of PBP bushfire protection measures and capacity for development

The capacity of private land to meet bushfire protection measures is influenced by various constraints including:

- Provision of APZs and the ability of future development to meet setback requirements as detailed in Table 9 due to slope and vegetation constraints
- Access and the ability of future development meeting the requirements of PBP, particularly the provision of perimeter roads
- Water supply and the ability of future development to meet the requirement of PBP

A high-level review of different development types and their ability to conform with bushfire protection requirements (within the Study Area) has been undertaken and is summarised as follows:

- In fill development: capacity to meet PBP requirements
- Subdivision: capacity to meet PBP requirements are limited due to access and APZ constraints
- Centre-based child care facilities, educational establishments and other Special Fire Protection Purpose Developments (SFPP): capacity to meet PBP requirements is unlikely due to SFPP APZ and access requirements.

9. Infrastructure

9.1. Methodology

An analysis of infrastructure in the Byles Creek study area was undertaken using a compilation of sources including Dial Before You Dig, cadastre data, shapefiles supplied by HSC and Government data.

Dial Before You Dig searches provides comprehensive infrastructure network information. Dial Before You Dig notification of no more than 30 days before commencement of work is a legislative requirement for any work on a private property, work by a public authority and work on underground utility services. Dial Before You Dig searches were requested from the following infrastructure providers:

- NBN Co
- Optus
- TPG
- Sydney Water
- Jemena
- Ausgrid.

Search results were received from all providers except for Ausgrid as the search area was deemed to be too complex. Sydney Water data supplied by Council matched the Dial Before You Dig search results and was used for mapping analysis.

The search results received from all providers were supplied in PDF format displayed as lines and points. ESRI's GIS application ArcGIS Pro was used to create shapefiles of the supplied search information. The process to create the shapefiles is shown below.

- PDF files saved as jpeg files with an identifying name and number corresponding with the search results
- Jpeg files loaded into ArcGIS Pro
- Jpeg imagery was georeferenced by match lot alignments shown on the search data and lot cadastre data
- Above process repeated for all relevant PDF files, PDF files outside of the study area or did not show infrastructure were excluded from this process
- The data was digested and saved as polyline and point shapefiles for each infrastructure component.

Other infrastructure data supplied by Hornsby Shire Council:

- Drainage easements
- Sydney Water infrastructure
- Council managed storm water infrastructure.

Government sources data:

- Electricity Transmission Lines (NSWLPI 2015)
- Electricity Easement (NSWLPI 2015).

The data was compiled into an Infrastructure map (Figure 23) displaying the Dial Before You Dig search results, electricity transmission line and the electricity easement and a Water Infrastructure map (Figure 24) displaying council managed water infrastructure and Sydney Water managed infrastructure.

9.2. Maps

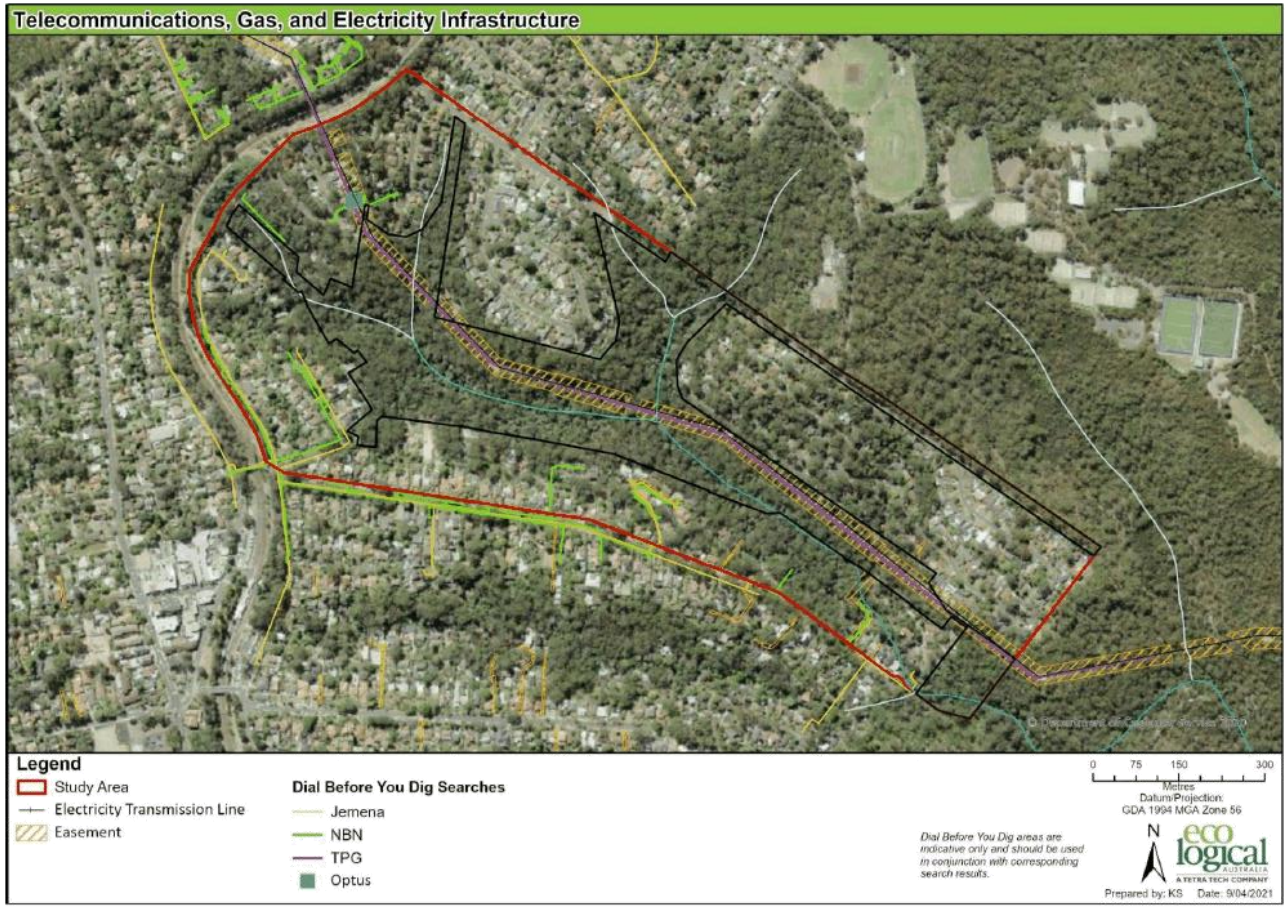

Figure 23: Infrastructure

Figure 24: Sydney Water and drainage infrastructure

ATTACHMENT 1 - ITEM 6

9.3. Results and Discussion

9.3.1. Telecommunications, gas and electricity infrastructure

The Dial Before You Dig search results are shown in Figure 23. The search results were digitised from PDFs and should be used in conjunction with the official results produced by the Dial Before You Dig search.

The NBN telecommunications and gas (Jemena) networks are confined to the residential areas within the study area extending mostly along the southern and western edges. The Optus search results showed one point within residential property located in the north west. The telecommunications and gas infrastructure are wholly outside the designated open space area.

TPG infrastructure, the electricity transmission line and easement extend through the study area from the north west residential, transecting bushland along and within the northern Open Space boundary in the central region of the study area until reaching the study area boundary in the south west. TPG infrastructure follows the electricity transmission thus limiting impacts within the Open Space area.

9.3.2. Water Infrastructure

The Sydney Water and council managed water infrastructure is an extensive network throughout the entire study area, however, is less concentrated in the Open Space area. Sewer infrastructure is the predominate water infrastructure type in the Open Space area with some water mains extending from the southern Open Space boundary. Contamination from sewer overflow and leakages is associated risk, overflows can occur from stormwater inflows and during dry periods from chokes, leaks from damaged pipes and damage from tree roots.

Access to TPG, electricity transmission lines/easement and water infrastructure within the Open Space area is required for maintenance and repair and will need to be maintained.

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Appendix A Likelihood of Occurrence

Table 10: Threatened ecological communities (TECs) likelihood table

Name	BC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Blue Gum High Forest of the Sydney Basin Bioregion	CEEC	CEEC	Occurs only in areas where rainfall is high (above 1100 millimetres per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest. A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (*Eucalyptus saligna*) and Blackbutt (*E. pilularis*). Forest Oak (*Allocasuarina torulosa*) and Sydney Red Gum (*Angophora costata*) also occur. Species adapted to moist habitat such as Lilly Pilly (*Acmena smithii*), Sandpaper Fig (*Ficus coronata*), Rainbow Fern (*Calochleana dubia*) and Common Maidenhair (*Adiantum aethiopicum*) may also occur. Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 hectares remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 hectares. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives	Likely
Castlereagh Scribbly Gum and Agnes Banks Woodland	VEC (Castlereagh Scribbly Gum Woodland)/ CEEC (Agnes Banks Woodland)	EEC	Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. Dominated by *Eucalyptus parramattensis* subsp. *parramattensis*, *Angophora bakeri* and *E. sclerophylla*. A small tree stratum of *Melaleuca decora* is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa, Melaleuca nodosa, Hakea sericea* and *H. dactyloides* (multi-stemmed form). The ground stratum consists of a diverse range of forbs including *Themeda australis, Entolasia stricta, Cyathochaeta diandra, Dianella revoluta* subsp. *revoluta, Stylidium graminifolium, Platysace ericoides*, *Laxmannia gracilis* and *Aristida warburgii*.	No
Coastal Swamp Oak (Casuarina glauca) Forest of NSW and SE Qld ecological community	EEC	EEC	Found on the coastal floodplains NSW North Coast, Sydney Basin and part of the South East Corner IBRA bioregions. Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20 m (rarely above 10 m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. The ecological community is typically found where groundwater is saline or	No

Name	BC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
			brackish but can occur in areas where groundwater is relatively fresh. It is typically found on coastal flats, floodplains, drainage lines, lake margins, wetlands and estuarine fringes where soils are at least occasionally saturated, water-logged or inundated. These are typically associated with low-lying coastal alluvial floodplains and alluvial flats (Keith and Scott, 2005). Minor occurrences can be found on coastal dune swales or flats, particularly deflated dunes and dune soaks.	
Coastal Upland Swamps in the Sydney Basin Bioregion	EEC	EEC	Endemic to NSW and confined to the Sydney Basin Bioregion. It occurs in the eastern Sydney Basin from the Somersby district in the north (Somersby-Hornsby plateaux) to the Robertson district in the south (n the Woronora plateau). Occurs primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture. Generally associated with acidic soils. May include tall open scrubs, tall closed scrubs, closed heaths, open graminoid heaths, sedgelands and fernlands. Larger examples may include a complex of these structural forms.	No
Cooks River / Castlereagh Ironbark Forest	EEC	CEEC	Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. The structure of the community may vary from tall open forests (>40m) to woodlands. The most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). *Eucalyptus baueriana* (blue box), *E. botryoides* (bangalay) and *E. elata* (river peppermint) may be common south from Sydney. *E. ovata* (swamp gum) occurs on the far south coast, *E. saligna* (Sydney blue gum) and *E. grandis* (flooded gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (prickly-leaved teatree), *Backhousia myrtifolia* (grey myrtle), *Melia azadarach* (white cedar), *Casuarina cunninghamiana* (river oak) and *C. glauca* (swamp oak). Scattered shrubs include *Bursaria spinosa, Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda* and *Phyllanthus gunnii.* The groundcover is composed of abundant forbs, scramblers and grasses.	No
River-flat Eucalypt Forest	EEC	-	The structure of the community may vary from tall open forests (>40m) to woodlands. The most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.	No

Name	BC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Shale Sandstone Transition Forest	CEEC	CEEC	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. It typically occurs in moderately wet sites, with an annual rainfall of 800-1100mm per year, and on clay soils derived from Wianamatta shale. The tree canopy is dominated by Turpentine and a variety of eucalypt species. Its distribution is mainly on the Cumberland Plain of the Sydney region. Was not recorded during the site inspection s.	No
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	EEC	CEEC	Open forest, with dominant canopy trees including *Syncarpia glomulifera* (Turpentine), *Eucalyptus punctata* (Grey Gum), *Eucalyptus paniculata* (Grey Ironbark) and *E. eugenioides* (Thin-leaved Stringybark). In areas of high rainfall (over 1050 mm per annum) *E. saligna* (Sydney Blue Gum) is more dominant. The shrub stratum is usually sparse and may contain mesic species such as *Pittosporum undulatum* (Sweet Pittosporum) and *Polyscias sambucifolia* (Elderberry Panax). Occurs close to the Shale/Sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaux. A transitional community, between Cumberland Plain Woodland in drier areas and Blue Gum High Forest on adjacent higher rainfall ridges.	No
Western Sydney Dry Rainforest and Moist Woodland on Shale	EEC	CEEC	A dry vine scrub community of the Cumberland Plain, western Sydney. Canopy trees include *Melaleuca styphelioides* (Prickly Paperbark), *Acacia implexa* (Hickory Wattle) and *Alectryon subcinereus* (Native Quince) . Many rainforest species occur in the shrub layer, such as *Notelaea longifolia* (Mock Olive) *(, Clerodendrum tomentosum* (Hairy Clerodendrum) and *Pittosporum revolutum* (Yellow Pittosporum). The shrub layer combines with vines, such as *Aphanopetalum resinosum (*Gum Vine), *Pandorea pandorana* (Wonga Vine) and *Cayratia clematidea (*Slender Grape) to form dense thickets in sheltered locations.	No

EEC= Endangered Ecological Community, VEC = Vulnerable Ecological Community, CEEC = Critically Endangered Ecological Community.

Table 11: Threatened species likelihood table

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Fauna						
Anthochaera phrygia	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West	72	Potential - occasional seasonal foraging habitat features associated with this

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).		species were identified within the site. The site is not within an important breeding area for the species.
Apus pacificus	Fork-tailed Swift		M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	13	Unlikely - suitable habitat not identified within the site.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		Widespread in NSW from coast to inland including the western slopes of the Great Dividing Range and farther west. Species have also been recorded in southern and southwestern Australia. Woodlands and dry open sclerophyll forest, usually eucalypts and mallee associations. Also have recordings in shrub and heathlands and various modified habitats, including regenerating forests. In western NSW, this species is primarily associated with River Red Gum/Black Box/Coolabah open forest/woodland and associated with larger river/creek systems.	21	Potential - occasional seasonal foraging habitat features associated with this species were identified within the site.
Callocephalon fimbriatum	Gang-gang Cockatoo	V		In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee. Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.	216	Likely - habitat features associated with this species were identified within the site
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		In NSW, widespread along coast and inland to the southern	9	Likely - habitat features associated

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				tablelands and central western plains, with a small population in the Riverina. Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.		with this species were identified within the site
Chalinolobus dwyeri	Large-eared Pied Bat		V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	2	Potential – suitable foraging habitat for this species identified within the site.
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo		M	Northern and eastern Australia, records mainly coastal in NSW south to Bega area. Non breeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodland.	5	Potential – suitable habitat for this species identified within the site.
Daphoenositta chrysoptera	Varied Sittella	V		Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, mallee and *Acacia* woodland.	8	Potential – suitable foraging habitat for this species identified within the site.
Dasyurus maculatus maculatus	Spotted-tailed Quoll		E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	5	Potential – suitable foraging habitat for this species identified within the site.
Falco hypoleucos	Grey Falcon	E1		Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	1	Potential – suitable foraging habitat for this species identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range. Tall (greater than 20m) moist habitats.	7	Potential – suitable habitat for this species identified within the site.
Glossopsitta pusilla	Little Lorikeet	V		In NSW, found from the coast westward as far as Dubbo and Albury. Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	58	Potential – suitable habitat for this species identified within the site.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	4	Unlikely - suitable habitat not identified within the site.
Heleioporus australiacus	Giant Burrowing Frog		V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	2	Potential - suitable habitat identified within the site.
Hieraaetus morphnoides	Little Eagle	V		Throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment. Open eucalypt forest, woodland or open woodland, including sheoak or *Acacia* woodlands and riparian woodlands of interior NSW.	8	Unlikely - suitable habitat not identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Hirundapus caudacutus	White-throated Needletail		M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	77	Unlikely - suitable habitat not identified within the site.
Ixobrychus flavicollis	Black Bittern	V		In NSW, records are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	1	Unlikely - suitable habitat not identified within the site.
Lathamus discolor	Swift Parrot		CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	56	Unlikely - suitable habitat not identified within the site.
Litoria aurea	Green and Golden Bell Frog		V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing *Typha* spp. (bullrushes) or *Eleocharis* spp. (spikerushes). Some populations occur in highly disturbed areas.	7	Potential – foraging habitat features were identified within the site.
Lophoictinia isura	Square-tailed Kite	V		In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast. Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	7	Likely - suitable habitat identified within the site and records within study area.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Micronomus norfolkensis	Eastern Coastal Freetail-bat	V		Found along the east coast from south Qld to southern NSW. Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	15	Unlikely - suitable habitat not identified within the site.
Miniopterus australis	Little Bentwing-bat	V		East coast and ranges south to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	18	Potential –habitat features were identified within the site.
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga. Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	654	Potential – foraging habitat features were identified within the site.
Myotis macropus	Southern Myotis	V		In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers. Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	9	Potential – foraging habitat features were identified within the site.
Ninox connivens	Barking Owl	V		Wide but sparse distribution in NSW, avoiding the most central arid regions. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	5	Potential –habitat features were identified within the site.
Ninox strenua	Powerful Owl	V		In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains. Woodland, open sclerophyll forest, tall open wet forest and rainforest.	1080	Potential – foraging habitat features were identified within the site.
Petauroides volans	Greater Glider		V	This population on the south coast of NSW is bounded by the Moruya	2	Likely - habitat features were

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. Eucalypt forests and woodlands.		identified within the site.
Petaurus norfolcensis	Squirrel Glider	V		Widely though sparsely distributed on both sides of the Great Dividing Range in eastern Australia, from northern Qld to western Victoria. Mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	1	Unlikely - suitable habitat not identified within the site.
Petroica boodang	Scarlet Robin	V		In NSW, it occurs from the coast to the inland slopes. Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	4	Unlikely - suitable habitat not identified within the site.
Petroica phoenicea	Flame Robin	V		In NSW, breeds in upland areas, and in winter many birds move to the inland slopes and plains, or occasionally to coastal areas. Likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands. In winter uses dry forests, open woodlands, heathlands, pastures and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathlands, shrublands and sedgelands at high altitudes.	1	Unlikely - suitable habitat not identified within the site.
Phascolarctos cinereus	Koala		V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	17	Unlikely - suitable habitat not identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Pommerhelix duralensis	Dural Land Snail	E1	E	Endemic to NSW. Occurs along the northwest fringes of the Cumberland Plain, within the Hills Shire, Blue Mountains City, Penrith City, Hornsby Shire and Parramatta City LGAs. Shale-sandstone transitional landscapes. Found in Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest; Turpentine-Ironbark Forest; Shale/Sandstone Transition Forest; Turpentine Ironbark Margin Forest; Hinterland Sandstone Gully Forest; and Sydney Hinterland Transition Woodland.	74	Potential - suitable habitat identified within the site.
Pseudomys australis	Plains Rat	E4	V	The Plains Rat is restricted to the gibber (stone-covered) plains of Lake Eyre Basin in northern South Australia, and is now presumed to be extinct in Queensland and NSW. The previous distribution of this species extended from the western edge of the Nullabor Range, to central Queensland, as well as the inland slopes of the Great Dividing Range to the mouth of the Murray River. In the Northern Territory, it was formerly present only in the extreme south-east region.	63	Unlikely - suitable habitat not identified within the site.
Pteropus poliocephalus	Grey-headed Flying-fox		V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	2063	Unlikely - suitable habitat not identified within the site.
Ptilinopus superbus	Superb Fruit-Dove	V		Principally from north-eastern Qld to north-eastern NSW. Further south, it is confined to pockets of suitable habitat, and occurs as far south as Moruya. Rainforest and closed forests. May also forage in eucalypt or acacia woodland	4	Unlikely - suitable habitat not identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				where there are fruit-bearing trees.		
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		There are scattered records of this species across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW. Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies.	13	Likely – seasonal foraging habitat available within the study area. No camps identified within study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	V		Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands. Woodland, moist and dry eucalypt forest and rainforest.	13	Potential - suitable habitat within the site.
Thalasseus bergii	Crested Tern		M	Identified as a conservation value in the Temperate East and North marine regions. Coastal seas, continental shelf.	1	Potential - suitable habitat within the site.
Tyto novaehollandiae	Masked Owl	V		Recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains. Dry eucalypt forests and woodlands from sea level to 1100 m.	1	Potential - suitable habitat within the site.
Flora						
Acacia bynoeana	Bynoe's Wattle		V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	1	Unlikely - suitable habitat not identified within the site.
Acacia cluniesrossiae	Kanangra Wattle	V		In NSW, occurs in Kowmung and Coxs River areas entirely within Kanangra-Boyd and Blue Mountains National Parks. Dry sclerophyll forest on skeletal soils on rocky slopes, or on alluvium along creeks.	1	Unlikely - suitable habitat not identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
Acacia pubescens	Downy Wattle		V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	4	Unlikely - the presence of this species was not identified (conspicuous species) and suitable habitat was not identified within the site.
Callistemon linearifolius	Netted Bottle Brush	V		Dry sclerophyll forest. Georges River to Hawkesbury River in the Sydney area (limited to the Hornsby Plateau area), and north to the Nelson Bay area of NSW. Also Coalcliff in the northern Illawarra.	2	Unlikely - the presence of this species was not identified within the site.
Darwinia biflora	-		V	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas, in an area bounded by Maroota, North Ryde, Cowan and Kellyville. Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	7348	Unlikely - the presence of this species was not identified (conspicuous species) and suitable habitat was not identified within the site.
Darwinia peduncularis		V		Disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. Rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	1	Unlikely - the presence of this species was not identified (conspicuous species) and suitable habitat was not identified within the site.
Dillwynia tenuifolia		E2, V		Mainly on the Cumberland Plain, but also Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains. Scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest, transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland, and	2	Likely - the presence of this species was not identified although suitable habitat was identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				disturbed escarpment woodland on Narrabeen sandstone.		
Epacris purpurascens var. purpurascens		V		Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Sclerophyll forest, scrubs and swamps. Most habitats have a strong shale soil influence.	442	Unlikely - the presence of this species was not identified (conspicuous species).
Eucalyptus camfieldii	Camfield's Stringybark		V	Narrow band from the Raymond Terrace area south to Waterfall. Coastal heath on shallow sandy soils overlying Hawkesbury sandstone, mostly on exposed sandy ridges.	1	Unlikely - the presence of this species was not identified (conspicuous species).
Eucalyptus nicholii	Narrow-leaved Black Peppermint		V	New England Tablelands from Nundle to north of Tenterfield. Dry grassy woodland, on shallow soils of slopes and ridges.	4	
Eucalyptus scoparia	Wallangarra White Gum	E1	V	In NSW it is known from only three locations near Tenterfield. Open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes.	1	Unlikely - the presence of this species was not identified (conspicuous species) and suitable habitat was not identified within the site.
Galium australe	Tangled Bedstraw	E1		Recorded historically in the Nowra (Colymea) and Narooma areas; extant in Nadgee Nature Reserve, south of Eden. Unconfirmed records from the Sydney region. Turpentine forest and coastal Acacia shrubland in NSW. Elsewhere sand dunes, sand spits, shrubland and woodland.	5	Unlikely - the presence of this species was not identified (conspicuous species) and the site is not within the species' distribution.
Genoplesium baueri	Bauer's Midge Orchid		E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	6	Potential - the presence of this species was not identified (conspicuous species) however there are known records within the site.
Genoplesium plumosum	Tallong Midge Orchid	E4A	E	Known only around Tallong and a site in Morton National Park 8.5 km south-east of Wingello. Heathland, generally dominated	1	Unlikely - the presence of this species was not identified within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				by *Kunzea parvifolia* (Violet Kunzea), *Calytrix tetragona* (Common Fringe-myrtle) and *Dillwynia* spp. (parrot-peas), on very shallow soils, often on sandstone conglomerate rock shelves.		
Grammitis stenophylla	Narrow-leaf Finger Fern	E1		In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabri. Rainforest and moist eucalypt forest, usually near streams, on rocks or in trees.	7	Unlikely - suitable habitat not identified within the site.
Grevillea caleyi	Caley's Grevillea	E4A	E	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Open forest, generally dominated by *Eucalyptus sieberi* and *E. gummifera* on a ridgetop, in association with laterite soils.	1	Unlikely - suitable habitat not identified within the site.
Haloragodendron lucasii		E1	E	Confined to a very narrow distribution on the north shore of Sydney. Dry sclerophyll forest and low open woodland on sheltered slopes near creeks, in moist sandy loam soils.	1	Unlikely - the presence of this species was not identified within the site
Hibbertia spanantha	Julian's Hibbertia		CE	Endemic to NSW where it is restricted to three locations. Currently only known from around Sydney. Grows in forest with canopy species including *Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata*. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. The soil is identified as a light clay occuring on a shale sandstone soil transition."	4	Unlikely - the presence of this species was not identified (conspicuous species) and the site is not within the species' distribution.
Hibbertia superans		E1		From Baulkham Hills to South Maroota in the northern outskirts of Sydney, and at one locality at Mount Boss, inland from Kempsey. Open woodland and	3	Unlikely - the presence of this species was not identified (conspicuous species) and the site is not

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				heathland, and appears to prefer open disturbed areas.		within the species' distribution.
Lasiopetalum joyceae		V	V	Restricted to the Hornsby Plateau south of the Hawkesbury River, between Berrilee and Duffys Forest. Heath on lateritic to shaley ridgetops over sandstone.	3	Unlikely - the presence of this species was not identified.
Leptospermum deanei	-		V	Hornsby, Warringah, Ku-ring-gai and Ryde LGAs in the Sydney region. Woodland, riparian scrub and open forest on lower hill slopes or near creeks, on sand or sandy alluvial soil.	13	Potential - not identified within the site however records exist within the study area.
Macadamia integrifolia	Macadamia Nut	P	V	Not known to occur naturally in the wild in NSW; recorded from Camden Haven but it is not known if the tree was cultivated or growing naturally. Drier subtropical rainforest.	12	Unlikely - the presence of this species was not identified.
Melaleuca biconvexa	Biconvex Paperbark		V	Only found in NSW, populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Damp places, often near streams or low-lying areas on alluvial soils.	1	Unlikely - the presence of this species was not identified.
Melaleuca deanei	Deane's Paperbark		V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	44	Unlikely - the presence of this species was not identified (conspicuous species) and the site is not within the species' distribution.
Persoonia hirsuta	Hairy Geebung		E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	3	Unlikely - the presence of this species was not identified (conspicuous species) within the site.
Pimelea curviflora var. *curviflora*	-		V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over	23	Unlikely - the presence of this species was not identified (conspicuous species) within the site.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 5km	Likelihood of occurrence on site
				sandstone and shale/sandstone transition soils on ridgetops and upper slopes.		
Pterostylis nigricans	Dark Greenhood	V		North-east NSW north from Evans Head, and in Qld. Coastal heathland with *Banksia ericifolia* (Heath Banksia), and lower-growing heath with lichen-encrusted soil surfaces, on sandy soils.	1	Unlikely - the presence of this species was not identified (conspicuous species) within the site.
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	14	Unlikely - the presence of this species was not identified (conspicuous species) within the site.
Rhodamnia rubescens	Scrub Turpentine	CE		Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm.	7	Unlikely - the presence of this species was not identified within the site.
Syzygium paniculatum	Magenta Lilly Pilly		V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	14	Unlikely - the presence of this species was not identified within the site.
Tetratheca glandulosa		V		Found from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Pittwater LGA) and the western limit is at East Kurrajong (Wollemi NP). Heath, scrub, woodlands and open forest on upper-slopes and mid-slope sandstone benches. Soils generally shallow, consisting of a yellow, clayey/sandy loam.	452	Potential - the presence of this species was not identified within the site, however there are records near the study area.

ATTACHMENT 1 - ITEM 6

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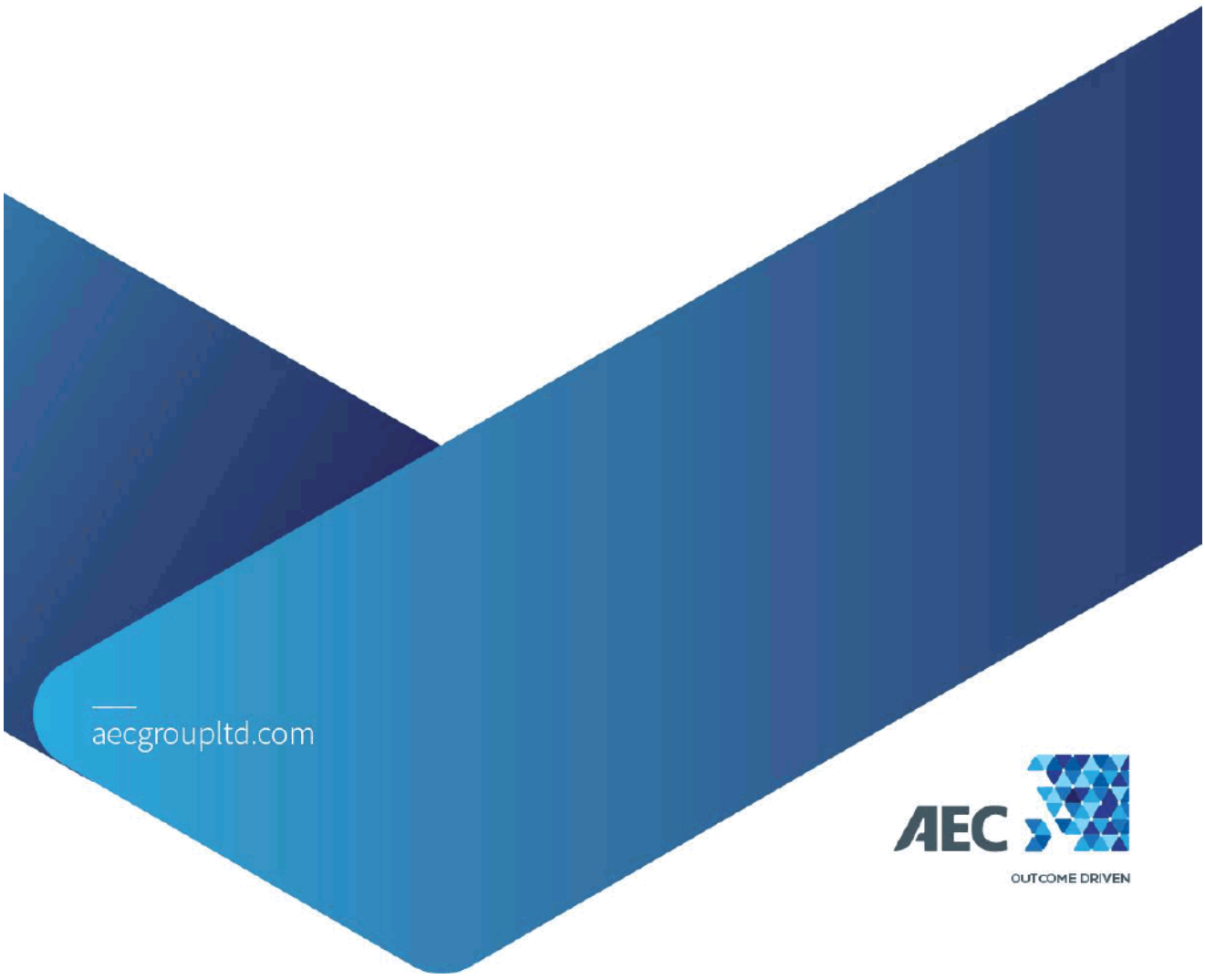
B Economic Implications Analysis

ATTACHMENT 1 - ITEM 6

BYLES CREEK PLANNING STUDY - ECONOMIC IMPLICATIONS ANALYSIS

ELTON CONSULTING
JULY 2021



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SUMMARY OF ECONOMIC IMPLICATIONS

Table ES. 1 summarises the key economic implications and likely level of impact to the land values and property owners as a result of the recommendations from the Byles Creek Planning Study (the Study).

The below findings take into account the residential lot audit, property groupings, constraints assessment and property market research undertaken by AEC. The approach undertaken was effectively an assessment of the economic impacts on the privately owned properties between 'current state' and 'future state' assuming the recommendations from the Study are implemented.

Table ES. 1. Summary of Economic Implications

Recommendation	Description	Level of Impact	Economic Implications
1. **Environmental Zoning**	Rezone all land from R2 - Low Density Residential to E4 – Environmental Living within the Study Area.	Minimal impact.	The difference in land uses permitted between an R2 and E4 zone would not impact the primary residential use of the properties and therefore **unlikely to have a material impact** on the land values on a precinct level based.
2. **Minimum Lot Size**	Increase minimum lot size from 600sqm to 40ha for land proposed to be zoned as E4 – Environmental Living.	Minimal impact to the Study Area as a whole.	Only five sites were identified to have potential for subdivision within the Study Area. Although there may be an impact on these owners on an individual lot-by-lot basis, a change in the minimum lot size will have a **minimal impact to the Study Area** as a whole as most lots appear to be fully developed.
3. Minimum Subdivision Lot Size Objectives	Strengthen the wording of Clause 4.1 objectives with the LEP to protect and enhance existing bushland and significant native vegetation.	Minimum impact.	An update to the objectives of Clause 4.1 is **unlikely to impact the land values** of private residential property owners in the Study Area. However, it may lead to additional environmental reports to be attached to future development applications, resulting in additional costs and time.
4. **Riparian Land**	Insert a new Local Provision Clause – Riparian Lands, for incorporation into the LEP, and provide supporting map.	Minimal impact to the land values in the Study Area.	Although the proposed riparian buffer zones impact the developable areas of land parcels, the zoning of land or the permissibility of uses is not impacted. Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, and the mapping overlay only serves to further enforce this provision. It is **not expected to have a significant impact on land values** to property owners in the Study Area.
5. **Community Education and Awareness Programs**	Increase community engagement and activity to help increase community awareness, foster a sense of ownership, and obtain community 'buy-in", as well as personal connection to the natural environment.	No financial impact.	Community education programs will increase awareness and likely to result in a positive social outcome for the community, however, there is **no perceived impact on land values** to the property owners.

Source: AEC, Elton Consulting.

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ATTACHMENT 1 - ITEM 6

1. INTRODUCTION

1.1 BACKGROUND

The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area. The corridor provides connectivity between the vegetation along Byles Creek and Lane Cove National Park. The connectivity of this corridor ensures the ability for native fauna to disperse between nearby reserves and the national park as well as providing habitat.

The corridor has been subject to a number of studies and reviews. Most recently, in August 2020, the Byles Creek Land Acquisition Strategy Review assessed the environmental and social values of Byles Creek corridor in order to review the strategic approach towards land acquisition within the catchment of Byles Creek. Based on the ecological values of the corridor, the Strategy Review concluded that the current extent of the RE1 zoning was appropriate to protect the biodiversity values and ecosystem functionality of the corridor with no additional land required to be acquired. Further, the current zoning is sufficient in terms of satisfying the objectives and terrestrial biodiversity provisions of the Hornsby Local Environmental Plan 2013.

However, following Hornsby Shire Council's (Council) considerations of the findings of the Strategy Review and significant community comment, Council resolved to progress the review of the suitability of the planning controls applicable to privately owned residential properties adjoining open space zoned land within the Byles Creek corridor with regard to protection and maintenance of the environmental values of the land.

Council engaged a suitably qualified, multidisciplinary team, led by Elton Consulting, to undertake this review, which is the subject of Byles Creek Planning Study ('the Study'). The outcomes of this Study will be used to inform any recommendations for changes to planning controls, including the *Hornsby Local Environmental Plan 2013* (LEP) and the *Hornsby Development Control Plan 2013* (DCP).

AEC Group Pty Ltd (AEC) formed part of the team led by Elton Consulting to specifically assess the potential economic implications of the recommendations of the Study.

1.2 OBJECTIVES

The objectives of the Study include:

- An assessment of the suitability of the current planning controls in protecting the environmental qualities of the Byles Creek corridor area;
- Development of a strategy that will minimise the impact of residential development and reflect the environmental, social and aesthetic qualities of the adjoining the Byles Creek corridor; and
- To identify, through a comparison with development controls of other Council areas, recommendations for improvements to Hornsby's planning controls to protect the environmental, social and aesthetic qualities.

The objectives of this report, which forms part of the Study, is to specifically assess the potential economic implications of the recommendations of the Study, particularly the economic impacts on the private residential landowners which adjoin the public open space zoned land of the Byles Creek corridor.

1.3 APPROACH

AEC was engaged to prepare supporting advice (this Report) as part of the Study. It involved assessing the economic implications to the privately owned properties within the Study Area as a result of changes to the planning controls based on the Study recommendations.

AEC's assessment has been prepared on a 'precinct level' basis and not on an 'individual property' basis as the project is intended to assess the 'Study Area' and not individual properties. Therefore, AEC's approach in undertaking the economic analysis involved the following:

- **Residential Lot Audit and Property Groupings** – The purpose was to audit all lots within the Study Area and group the property types based on their potential to be subdivided and developed for housing. The reason this

factor was chosen as the basis for property groupings is because changes to planning control affecting subdivision are likely to have the greatest impact on utility value and economic returns to the private landowners. The groupings created include the following:

  - Properties with 'No Further Subdivision Potential'
  - Properties 'Unlikely to be Subdivided'
  - Properties that represent 'Potential Subdivision Land'

- **Assessment of Property Constraints** – EcoLogical Australia Pty Ltd undertook an ecological survey of Study Area as part of the first phase of work. The survey results were able to highlight and map the ecological and natural constraints impacting the Study Area and particularly the privately owned land adjoining the open space zoned land within the Byles Creek Corridor. AEC also reviewed existing constraints mapping (e.g. flooding, bushfire etc) to assess the current state constraints affecting the properties in the Study Area.
- **Input into Formulation of Recommendations** – AEC's preliminary assessment of the extent of properties potentially impacted from changes to planning controls, and based on an iterative process with Elton Consulting, AEC provided input into consideration of the Study recommendations.
- **Review of the Study Recommendations and Assessment of Economic Implications** – Upon production of the recommendations, with benefit of the residential lot audit, property groupings, constraints assessment and property market research involving analysis of residential sales evidence in the locality, AEC was able to provide a considered opinion of the potential economic implications of the Study recommendations. The approach was effectively an assessment of the economic impacts on the privately owned properties between 'current state' and 'future state' assuming the recommendations from the Study are implemented.

1.4 LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions apply to this Report:

- This report is not a valuation report and not intended to be a value assessment of individual properties in the Study Area.
- The economic assessment of implications is undertaken on a 'precinct' basis and not on an 'individual property' basis.
- AEC undertook roadside assessments, desktop research, reviewed aerial imagery, mapping and have not internally inspected the properties within the Study Area.
- AEC have, where possible, tried to prepare a 'quantitative' assessment of the economic impacts and where such assessment is not possible to quantify numerically, a qualitative assessment involving commentary has been provided describing the likely economic impacts.
- AEC have assumed for property groupings which meet minimum development controls permitting subdivision that subdivision is permissible and can occur. However, an influencing factor that underpins property owners' decision to reside in the Study Area is the desire to live near or adjoining a natural bush setting. This desire, in certain circumstances, has influenced land not being subdivided in an effort to minimise impact on the natural environment even though subdivision may be permitted and represents a higher and better use economically.

2. THE STUDY AREA

2.1 OVERVIEW

The Study Area comprises private properties zoned 'R2 Low Density Residential' and select few with a dual zoning of 'R2 Low Density Residential' and 'RE1 Public Recreation' under the provisions of Hornsby Local Environmental Plan 2013 (HLEP) which surround the Byles Creek corridor open space zoned land.

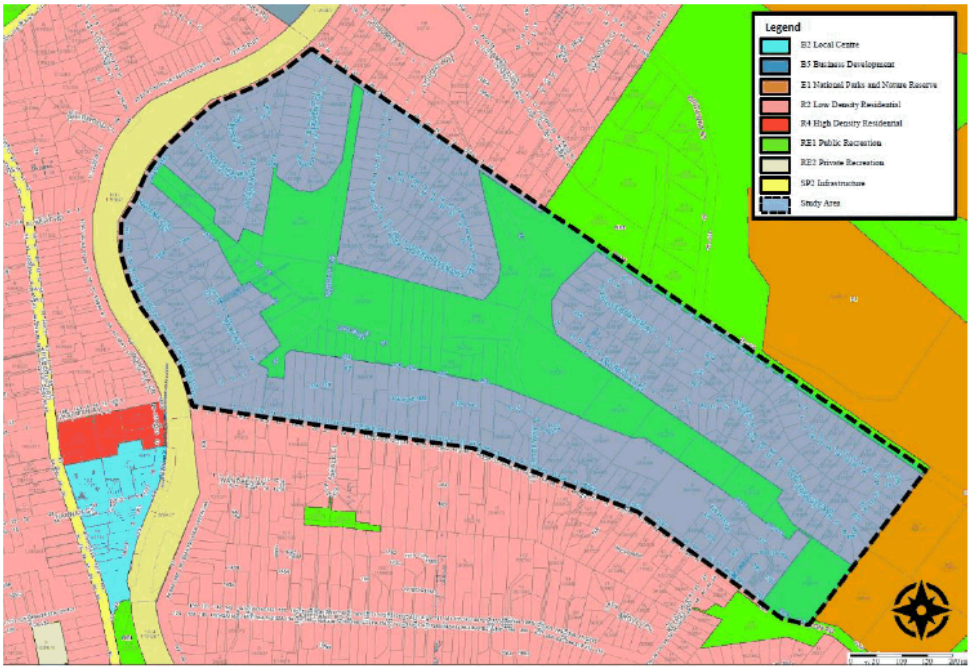
Development in the Study area is generally characterised by single or two storey detached dwellings comprising mixed vintages including some post-federation period homes, selection of modern residences and then a range of housing having been constructed during in the 1970's and 1980's, some having undergone refurbishment. A number of larger estates appear to have tennis courts and backyard swimming pools based on aerial imaging.

The extent, age and position of housing improvements on the individual properties are factors which can influence the ability of certain residential lots to be subdivided and are factors which AEC have considered at a high-level in preparing the property groupings.

The majority of land along the existing Byles Creek corridor is zoned RE1 Public Recreation and comprises intact dense native vegetation. Properties not adjoining the Byles Creek corridor but within the Study area are less impacted by the ecological sensitivities and based on the lot audit not likely to have subdivision potential.

Figure 2.1 below indicates the Study Area, which is bounded by Malton Road, Sutherland Road, Azalea Grove, Kurrajong Street and Lane Cove National Park.

Figure 2.1: Byles Creek Catchment Study Area and Zoning



Source: Hornsby Shire Council.

2.2 LAND USE CLASSIFICATIONS AND DEVELOPMENT CONTROLS

In accordance with information obtained from the NSW Planning Portal, Hornsby LEP and DCP, the current zoning and development controls relevant to the Study Area and a brief synopsis of each, are provided in the following table.

Table 2.1. Land Use Classifications, Byles Creek Study Area

Zoning	**R2 – Low Density Residential**
Objectives	• To provide for the housing needs of the community within a low-density residential environment. • To enable other land uses that provide facilities or services to meet the day to day needs of residents.
Permitted without Consent	Environmental protection works; Home occupations
Permitted Use With Council Consent	Boarding houses; Building identification signs; Business identification signs; Centre-based child care facilities; Community facilities; Dwelling houses; Educational establishments; Emergency services facilities; Exhibition homes; Flood mitigation works; Group homes; Home-based child care; Home businesses; Information and education facilities; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Public administration buildings; Recreation areas; Recreation facilities (outdoor); Respite day care centres; Roads; Tank-based aquaculture; Tourist and visitor accommodation; Veterinary hospitals; Water reticulation systems
Prohibited	Backpackers' accommodation; Farm stay accommodation; Hotel or motel accommodation; Serviced apartments; Any other development not specified above.
Floor Space Ratio	Nil prescribed.
Minimum Lot Size	600 sqm (excluding access handle land area for 'hatchet' shaped lots)
Minimum Lot frontage	15 metres (3.5 metres for the access handle)
Building Height Limit	8.5 metres
Zoning	**RE1 – Public Recreation**
Objectives	• To enable land to be used for public open space or recreational purposes. • To provide a range of recreational settings and activities and compatible land uses. • To protect and enhance the natural environment for recreational purposes. • To protect and maintain areas of bushland that have ecological value.
Permitted without Consent	Environmental protection works
Permitted Use With Council Consent	Aquaculture; Building identification signs; Business identification signs; Camping grounds; Car parks; Caravan parks; Cemeteries; Centre-based childcare facilities; Community facilities; Emergency services facilities; Environmental facilities; Flood mitigation works; Kiosks; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Roads; Water reticulation systems
Prohibited	Any development not specified above.

Source: Hornsby LEP (2013).

3. ECONOMIC IMPLICATIONS OF RECOMMENDATIONS

Table 3.1 summaries the recommendations developed for the Byles Creek Study Area, following a period of community consultations and ecological assessments.

Table 3.1. Summary of Recommendations

Recommendation	Expected Outcome
1. Environmental Zoning Rezone all land within the Study Area currently zoned R2 – Low Density Residential proposed to E4 – Environmental Living.	To ensure environmental protection and enhancement is a key matter of consideration for new development and gives statutory weight to this consideration. To ensure careful consideration is given to compatibility of development with the ecological significance of the area.
2. Minimum Lot Size Increase minimum lot size for land proposed to be zoned as E4 – Environmental Living to 40ha. Review and update Minimum Lot Size Clause 4.1 objectives to support project objectives.	To prevent any further subdivision of land with special environmental values within the Study Area.
3. Minimum Subdivision Lot Size Objectives Strengthen the wording of Clause 4.1 objectives with the LEP to protect and enhance existing bushland and significant native vegetation.	Strengthening the clause objectives will ensure that adequate consideration is given to bushfire constraints and protection of bushland, biodiversity, and significant landscape features.
4. Riparian Land Insert a new Local Provision Clause – Riparian Land into the Hornsby LEP 2013 and provide supporting riparian corridor mapping. Provide a supporting map which identifies Byles Creek and prescribed Core Riparian Zone (CRZ) for first, second and third order watercourses which occur in the Study Area: • 1st Order – 10m (each side of the watercourse) • 2nd Order – 20m (each side of the watercourse) • 3rd Order – 30m (each side of the watercourse)	Protect and maintain the ecological habitat accommodated by the waterways and associated riparian corridors within Byles Creek and the surrounding Study Area. Ensure that all development along the riparian corridor have consideration for the environmental impacts to the waterway. Ensure a consistent approach to protection, management and enhancement of the waterway and supporting habitat such as the incorporation of locally occurring riparian vegetation.
5. Community Education Programs Increase community engagement and activity to help increase community awareness, foster a sense of ownership, and obtain community 'buy-in", as well as personal connection to the natural environment. These can include: • supporting educational material • interpretive signage • workshops (such as DIY nest-boxes) • free materials such as plants, nest boxes and other habitat features.	The support and "buy-in" of the local community are essential when implementing new and existing environmental planning controls on private land. Community involvement is necessary in order to increase awareness of the importance of protecting and enhancing the environmental and ecological values of Byles Creek.

Source: Elton Consulting.

3.1 RECOMMENDATION 1 – ENVIRONMENTAL ZONING

The change from **R2 – Low Density Residential** to **E4 – Environmental Living** will allow a similar type of development (i.e. low-density housing), and therefore there is minimal change to the 'highest and best use'. The E4 zone has more focus on environmental objectives to protect and preserve the ecological and environmental values of the Byles Creek corridor.

The current R2 – Low Density Residential and proposed E4 – Environmental Living zones under the Hornsby Local Environmental Plan 2013 were compared to identify the changes in zoning and whether there will be any potential economic implications to landowners of the Study Area.

3.1.1 Objectives of the Zone

Table 3.2. Objectives of R2 and E4 zoning, Hornsby LEP 2013

	R2 Low Density Residential (R2)	E4 Environmental Living (E4)
Objectives	• To provide for the housing needs of the community within a low-density residential environment. • To enable other land uses that provide facilities or services to meet the day to day needs of residents.	• To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values. • To ensure that residential development does not have an adverse effect on those values. • To permit development that is compatible with the character infrastructure capacity and access limitations of the area.

Source: Hornsby LEP (2013).

In reviewing the objectives of the current R2 and recommended change in zoning to E4 for the Byles Creek Study Area, it is noted that while both zones identify the provision of housing as an objective, the E4 zone takes into consideration environmental influences, ensuring that development does not have any adverse impacts on special ecological, scientific or aesthetic values.

The R2 zone allows for 'low density' residential development, whereas E4 indicates residential development to be 'low-impact'. While it can be argued that these are interrelated, 'low density' refers to the physical form of new development (height, footprint etc), whereas 'low-impact' implies minimal effects as a result of proposed development. Additional environmental reports and/or studies may be required under the E4 zoning to demonstrate that there are minimal adverse impacts to the environment as a result of new or additions/alterations to residential development.

Economic impacts of these differences in objectives are considered **non-tangible** to the market. From the community consultations undertaken by Elton Consulting, it is observed that all landowners that participated in the surveys identified that the environmental features of the corridor, including the bushlands, native flora and fauna, and wildlife are important characteristics to property owners in the Study Area. Residences on large parcels of land with a green and leafy outlook were also identified as an important characteristic. As such, it can be assumed that owners value the ecological aspects of the area, which largely aligns to the objectives of the E4 zoning.

Furthermore, it should also be noted that the E4 zoning will not have any bearing on the application of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (Codes SEPP) for land within the Study Area, where:

- The current heritage conservation area overlay already restricts application of the Codes SEPP (including both exempt and complying development)
- An E4 land use zoning does not comprise an "Environmentally Sensitive Area" for the purposes of applying the provisions of the Codes SEPP.

3.1.2 Permitted and Prohibited Uses

Table 3.3. Permitted Uses under R2 and E4 zoning, Hornsby LEP 2013

	R2 Low Density Residential	E4 Environmental Living
Permitted without Consent	Environmental protection works; Home occupation	Environmental protection works; Home occupation
Permitted Uses	Boarding houses; Building identification signs; Business identification signs; Centre-based child care facilities; Community facilities; Dwelling houses; Educational establishments; Emergency services facilities; Exhibition homes; Flood mitigation works; Group homes; Home-based child care; Home businesses; Information and education facilities; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Public administration buildings; Recreation areas; Recreation facilities (outdoor); Respite day care centres; Roads; Tank-based aquaculture; Tourist and visitor accommodation; Veterinary hospitals; Water reticulation systems	Building identification signs; Business identification signs; Dwelling houses; Flood mitigation works; Group homes; Home-based childcare; Oyster aquaculture; Pond-based aquaculture; Roads; Tank-based aquaculture; Tourist and visitor accommodation; Water reticulation systems
Prohibited Uses	Backpackers' accommodation; Farm stay accommodation; Hotel or motel accommodation; Serviced apartments; Any other development not specified in item 2 or 3 (above).	Backpackers' accommodation; Farm stay accommodation; Hotel or motel accommodation; Industries; Service stations; Serviced apartments; Warehouse or distribution centres; Any other development not specified in item 2 or 3 (above).

Source: Hornsby LEP 2013.

The majority of the land uses permitted under R2 but prohibited under E4 are land uses that are not likely to be developed in the Study Area or uses that would not ordinarily attract more value to the land if such uses were contemplated on the land. Within table 3.3 above, the land uses in 'red' text are not listed in either the R2 or E4 zones.

Boarding houses, centre-based childcare facilities and exhibition homes can be found within a residential neighbourhood context however given the characteristics of the Study Area, it is unlikely such development would proceed given the land size and other demand drivers required. These uses are not observed in the Study Area currently.

Educational establishments, respite day care centres and veterinary hospitals whilst permitted as non-residential land uses, are not likely to fit within the neighbourhood context of the Byles Creek residential area. Their land requirements, parking and traffic impacts will render such uses not likely to occur in the neighbourhood. These uses are also not observed in the Study Area currently.

Places of public worship, community facilities, public administration buildings, recreation areas, recreation facilities are all non-commercial type uses and the current residential land values will provide a barrier to entry for acquisition.

Whilst the list of prohibited uses under E4 (as compared to R2) are numerous, the likelihood that these land uses will occur within the Study Area is low. Also, the ability that these prohibited land uses can compete with the incumbent low density residential land use is also low. For these reasons the value implications we consider from the market's perspective would be **immaterial**.

3.1.3 Market Analysis

To understand whether there is a value difference perceived by the market between R2 and E4 zoned land, the following was undertaken:

- Review Valuer General (VG) land assessments from a sample of R2 zoned land and compared to land value assessed by the VG of E4 zoned land.

- VG land value comparison samples were not able to be found within the Hornsby LGA and therefore AEC 'paired' land value samples from other LGA's where R2 and E4 zoned land was generic and represented minimal difference in land size and were ideally lots that lie side-by-side with the differentiating factor being the zoning. In most circumstances, AEC found that the E4 zoning was related to bushfire related designation.
- In addition to 'pairing' land value assessments, AEC consulted with the VG's office to understand their approach to assessing value on R2 and E4 zoned land. Based on informal discussion, the VG's confirmed that it is the highest and best use of the land which is a key determining factor affecting value. On the basis that the utility and use of the land is not altered from its highest and best use then the value assessments on the land for rating purposes should be the same/similar despite the zoning difference of R2 and E4. AEC note that the approach taken by the VG is along the same approach taken for valuation of property for market purposes.

Based on the above investigations and analysis undertaken, AEC confirm the value implications we consider from the market's perspective for a change in zoning from R2 to E4 would be **immaterial**.

3.2 RECOMMENDATION 2 – MINIMUM LOT SIZE

The number of lots within the Byles Creek Study Area that have the potential for subdivision are in a minority, and as such the impact of a change in the minimum lot size control is **unlikely to have a significant economic impact to the Study Area as a whole.** Individual property owners (depending on their intentions for development) may subsequently experience a decrease in their property values.

A change in the minimum lot size controls within the Study Area will have an impact on a landowner's ability to subdivide their land and therefore reduce their development potential.

Under existing controls within the R2 Low Density Residential zone, the minimum lot size in the Study Area is 600sqm, which is higher than other areas of the LGA of 500sqm. A change in the minimum lot size to 40ha (in line with other E4 zoned land in the LGA) ensures that no lots within the Study Area will have the potential for subdivision.

Properties within the Byles Creek Study Area are on larger parcels of land, characterised by residences of large footprints and prime improvements (e.g. outdoor pools, tennis courts etc). Selected lots also have dual zoning of R2 and RE1 (Public Recreation). Constraints due to size, existing improvements, limited developable areas (due to RE1 zoning) and access issues are also factors which will limit subdivision potential.

3.2.1 Residential Lot Analysis – Potential for Subdivision

An analysis was undertaken to identify the lots that may be impacted by a change in minimum lot sizes. The methodology and assumptions used to identify these lots is outlined in Appendix B.

Figure 3.1 outlines the lots which have the potential for subdivision.

While a number of lots had the minimum size required for subdivision (i.e. greater than 1,200 sqm), other factors such as the inclusion of accessways, shape of the lots, developable area (excluding RE1 land), and the quality of existing improvements render the lots **unlikely** to have subdivision potential based on our professional judgement.

Note: *this assessment is high-level in nature and not intended to be on an individual lot-by-lot assessment basis. The decision to submit an application for subdivision is ultimately up to the landowners, regardless of the constraints outlined by AEC. Individual assessments of each lot are not within the scope of the Study.*

Figure 3.1. Lots with Subdivision Potential, Byles Creek Study Area

Source: AEC

From a desktop aerial review and review of planning and environmental constraints, there are only five lots within the Study Area that AEC have identified to have potential for subdivision. One lot identified has a current development consent for the subdivision one lot into five (79-87 Malton Road, Beecroft), specifically marked in Figure 3.1. and therefore has secured the benefit to commence the subdivision as per the approval, as long as the DA remains valid or once activated with substantial commencement of works.

There are 433 lots in the Study Area, comprising a total of 657,924 sqm. The land parcels with potential for subdivision comprise 5% of the total area within the Study Area, or 1% if calculated by number of lots. Thus, the economic impact of the change in minimum lot size for the Study Area as a whole is expected to be **minimal**, and only impacts a handful of sites. The land at 79-87 Malton Road will not be impacted as the subdivision and building envelopes have already been approved by the Land and Environment Court, however the Development Consent is due to lapse and therefore will be subject to any planning control changes once it expires.

On an individual basis, however, the economic impact to the landowners with additional subdivision potential may potentially be significant. Impact to individual landowners are not in scope of this Study, however a high-level analysis comparing various development sites with and without subdivision potential have been undertaken to understand the magnitude of this change. There is a lack of development site sales observed for large residential parcels of land without subdivision potential, as such E4 zoned sites were included for comparison.

Table 3.4. Development Site Sales

Address	Zoning	Sale Price	Size (sqm)	Rate/sqm	Rate per Lot	Description
No Subdivision Potential						
35D Malton Road, Beecroft	R2	$1,250,000 (Nov-20)	2,426	$515/sqm	N/A	Vacant parcel on irregular shaped lot with long access way. DA approved plans for contemporary residence.
320 Old Northern Road, Castle Hill	E4	$900,000 (Apr-21)	2,182	$412/sqm	N/A	Vacant parcel within close proximity to metro station and shopping centre.

Address	Zoning	Sale Price	Size (sqm)	Rate/sqm	Rate per Lot	Description
41 Pioneer Place, Castle Hill	E4	$1,550,000 (Jun-20)	2,046	$758/sqm	N/A	Vacant parcel with DA approval for five-bedroom home within E4 zoning.
65A Roland Avenue, Wahroonga	E4	$1,290,000 (May-20)	3,000	$430/sqm	N/A	Vacant parcel with building area of approx., 1,000 sqm with E4 zoning.
Subdivisional Land						
92 Cardinal Avenue, West Pennant Hills	R2	$2,965,000 (Jun-21)	1,570	$1,889/sqm	$1,482,500 per lot	Sold with DA approval for two lot subdivision of 778 sqm and 791 sqm. Existing improvements include two separate dwellings on one title.
16A Thorn Street, Pennant Hills	R2	$2,855,000 (May-21)	2,106	$1,356/sqm	$951,667 per lot	Sold with three-lot subdivision DA approval, ranging from 522 sqm to 544sqm (excl. accessway).
11 Fleur Close, West Pennant Hills	E4	$1,700,000 (Apr-21)	6,513	$261/sqm	N/A	No DA approval in place, however minimum lot size in The Hills Shire LGA is 2,000 sqm, indicating a potential three-lot subdivision.
46A Lyndon Way, Beecroft	R2	$2,950,000 (Mar-21)	1,631	$1,809/sqm	$1,475,000 per lot	Sold with DA approved two lot subdivision, to redevelop the tennis court. Lot 1: 755 sqm, Lot 2: 601 sqm.
101-103 Wongala Crescent, Pennant Hills	R2	$1,645,000 (Jan-21)	1,448	$1,136/sqm	$822,500 per lot	DA Approval for two lot subdivision while maintaining existing residence and construct an additional dwelling. Lot sizes are 660sqm and 808 sqm.
54 Somerset Street, Epping	R2	$2,400,000 (Nov-20)	1,227	$1,227/sqm	$1,200,000 per lot	DA approved two lot subdivision.
10 York Street, Beecroft	R2	$3,450,000 (Oct-20)	2,149	$1,605/sqm	$1,150,000 per lot	Sold with DA approval for three luxury residences.

Source: Domain, RealEstate.com.au.

The above analysis indicates that a larger residential parcel with no subdivision potential generally achieves an analysed sales rate of less than $800/sqm, whereas a large parcel with a DA approval for subdivision ranges from $1,100/sqm up to $1,800/sqm. Large vacant blocks are generally sold with DA approvals in place in order to maximise their sale realisation.

Consideration also needs to be made with regards to the development application processes and other purchaser preferences within the Byles Creek area. If properties with subdivision potential within the Study Area were listed on the market, the likelihood of these being purchased by developers looking to subdivide may not be stronger than owner occupiers looking for larger residences with an environmental outlook. This is due to a number of reasons:

- Development applications for subdivision in this corridor have historically been met with strong community resistance, leading to a long, costly and uncertain development application period. This is evidenced through the public feedback received for the DA for the subdivision at 79-87 Malton Road, and the single dwelling application for 65D Malton Road (although not an application for subdivision, it is the legacy of a previous subdivision and requires clearing of a significant number of trees).
- Landowners indicated during the community consultation undertaken by Elton Consulting that an important characteristic of residential lands in the Byles Creek corridor included the size of the land parcels, which are larger with plenty of space and distance between residences, within close proximity to natural bushland and native wildlife. These values are likely to be mirrored by future potential landowners in the Study Area.

3.3 RECOMMENDATION 3 - MINIMUM SUBDIVISION LOT SIZE OBJECTIVES

Clause 4.1 of the Hornsby LEP is as follows:

The objectives of this clause are as follows:

(a) To provide for the subdivision of land at a density that is appropriate for the site constraints, development potential and infrastructure capacity of the land;

(b) To ensure that lots are of a sufficient size to accommodate development.

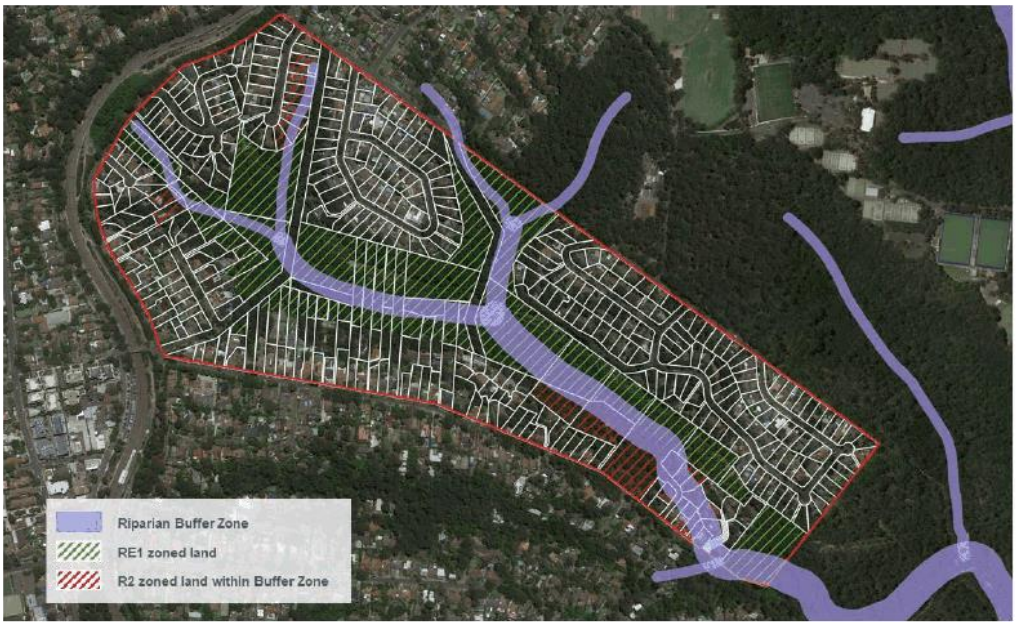
The recommendation to strengthen the objectives under this clause to ensure adequate consideration is given to environmental constraints is **unlikely to impact the property values of the private residential landowners in the Study Area** as it is not expected to significantly impact development potential, as consideration to 'site constraints' is already required under the clause. This may, however, impact the way future subdivision applications across the Hornsby Shire are assessed for approval and may require additional environmental reports to be accompanied with future development applications, which will result in landowners incurring additional time and costs at the application stage.

3.4 RECOMMENDATION 4 – RIPARIAN LAND

The provision of a new Riparian Lands Clause and supporting mapping overlay in the LEP, supported by associated updates to the DCP to provide 10m vegetated buffers, may impact the developable areas of certain residential lots within the Study Area.

Figure 3.2 shows the riparian buffer zones, as recommended by Eco Logical Australia, against the property lots within the Study Area.

Figure 3.2. Proposed Riparian Buffer Zones, Byles Creek Study Area



Source: Ecological, AEC.

The buffer zone overlaps a total of 28 property lots. Upon review of these lots, the existing improvements on the majority of these impacted lots are not within the buffer zone. However, there are **13** properties that are developed either partially or wholly within the buffer zone, along the south-west corner of the Study Area (along Malton Road). These properties are all considered fully developed, with the exception of 79-87 Malton Road (with DA approved) and 65D Malton Road. As such, the proposed Riparian mapping overlay is expected to have **minimal impact** to the Study Area as a whole.

A mapping overlay and accompanying clause does not change or otherwise affect the zoning of land or the permissibility of uses, and only applies as a matter for consideration in the assessment of a development where an application would already be required.

Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, the new Clause and mapping overlay serves to further enforce riparian buffer provisions which exist in the DCP.

Accordingly, this recommendation is **not expected to have a significant impact on land values** to property owners in the Study Area.

3.5 RECOMMENDATION 5 – COMMUNITY EDUCATION AND AWARENESS PROGRAMS

Through the provision of community education programs, awareness of the importance of the Byles Creek corridor will be increased which is likely to enhance and protect the ecological and environmental values of the corridor. Whilst this will result in a positive social outcome for the community, there is **no perceived impact on land values** to the property owners.

3.6 OTHER ECONOMIC IMPLICATIONS

Two other minor economic implications of implementing all the recommendations for Council to consider include the following:

- **Reduction in Council Rates** – The 'downzoning' of land within the Study Area through the restriction on subdivision is likely to impact the 4 residential lots identified in our mapping to have subdivision potential. If the Valuer General reflects the inability to subdivide these lots in their land value assessment then there is likely to be a reduction in the statutory land value which conversely results in a reduction in council rates collected based on the standard rates formula being applied.
- **Additional DA Preparation Costs** – Depending on the nature of the development application, certain types of activities proposed by landowners adjoining the Byles Creek corridor and within or adjoining the Riparian corridor may be requested to obtain additional environment related consultant reports to accompany a development application which has an impact of increasing preparation time and costs associated with a development application for a landowner in the Study area.

3.7 SUMMARY OF ECONOMIC IMPLICATIONS

Table 3.5 summarises the key economic implications and level of impact to the land values and property owners as a result of the draft recommendations from the Byles Creek Planning Study.

Table 3.5. Summary of Economic Implications of Draft Recommendations

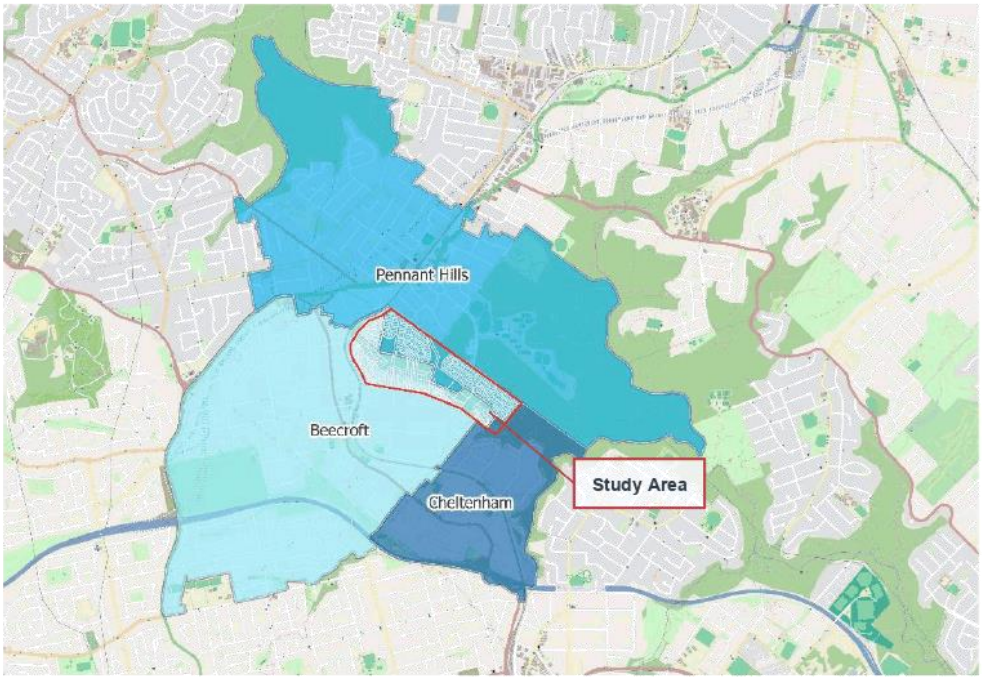
Recommendation	Description	Level of Impact	Economic Implications (on a Precinct Level)
1. Environmental Zoning	Rezone all land from R2 – Low Density Residential to E4 – Environmental Living.	Minimal impact.	The difference in land uses permitted between an R2 and E4 zone would not impact the primary residential use of the properties and therefore **unlikely to have a material impact** on the land values on a precinct level based.
2. Minimum Lot Size	Increase minimum lot size from 600sqm to 40ha for land proposed to be zoned as E4 – Environmental Living.	Minimal impact to the Study Area as a whole.	Only five sites were identified to have potential for subdivision within the Study Area. Although there may be an impact on these owners on an individual lot-by-lot basis, a change in the minimum lot size will have a **minimal impact to the Study Area** on a precinct level with most lots appearing to be fully developed.
3. Minimum Subdivision Lot Size Objectives	Strengthen the wording of Clause 4.1 objectives with the LEP to protect and enhance existing bushland and significant native vegetation.	Minimum impact.	An update to the objectives of Clause 4.1 is **unlikely to impact the land values** of private residential property owners in the Study Area. However, it may lead to additional environmental reports to be attached to future development applications, resulting in additional costs and time.
4. Riparian Land mapping overlay	Insert a new Local Provision Clause – Riparian Lands, for incorporation into the LEP, and provide supporting map.	Minimal impact to the land values in the Study Area.	Although the proposed riparian buffer zones impact the developable areas of land parcels, the zoning of land or the permissibility of uses is not impacted. Furthermore, the current DCP controls already restricts development of waterfront land as part of the DA process. As such, and the mapping overlay only serves to further enforce this provision. It is **not expected to have a significant impact on land values** to property owners in the Study Area.
5. Community Education and Awareness Programs	Increase community engagement and activity to help increase community awareness, foster a sense of ownership, and obtain community 'buy-in", as well as personal connection to the natural environment.	No financial impact.	Community education programs will increase awareness and likely to result in a positive social outcome for the community, however, there is **no perceived impact on land values** to the property owners.

Source: AEC

APPENDIX A: PROPERTY MARKET ANALYSIS

The Study Area spans across the suburban boundaries of Beecroft, Pennant Hills and Cheltenham.

Figure A. 1: Suburbs surrounding the Study Area



Source: AEC.

A brief market commentary on each suburb is detailed below.

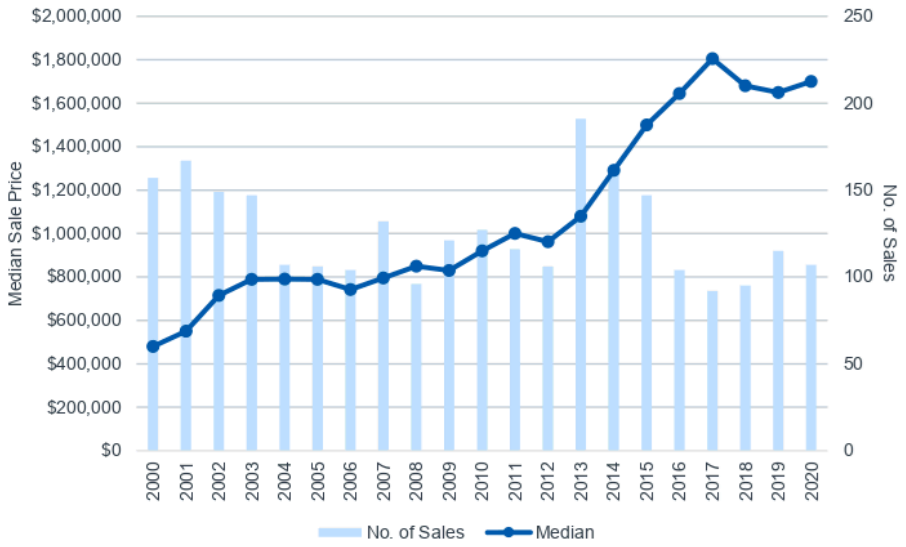
Beecroft

Beecroft is located approximately 22 kilometres north-west of the Sydney CBD and 12 kilometres north of Parramatta CBD, with reasonably good bus and rail transportation links. Beecroft station is on the Northern line of the train network. There are a number of shops and offices located between Beecroft Road and Beecroft station, including Beecroft Place which is anchored by Woolworths.

According to the 2016 ABS Census, 90.0% of total dwellings were separate houses, 3.7% were semi-detached dwellings, whilst 6.0% of total dwellings were flats or apartments. The average number of bedrooms of 3.7 per dwelling is higher than the NSW average of 3.0, with 58.9% of dwellings with four or more bedrooms in Beecroft.

In 2020, there were 107 sales with a median house price of $1,700,000. The sales price ranged from $650,000 to $4,000,0000.

Figure 3.3: Sales and Growth Chart, Beecroft (2000 – 2020)



Source: Price Finder (2021), AEC.

Pennant Hills

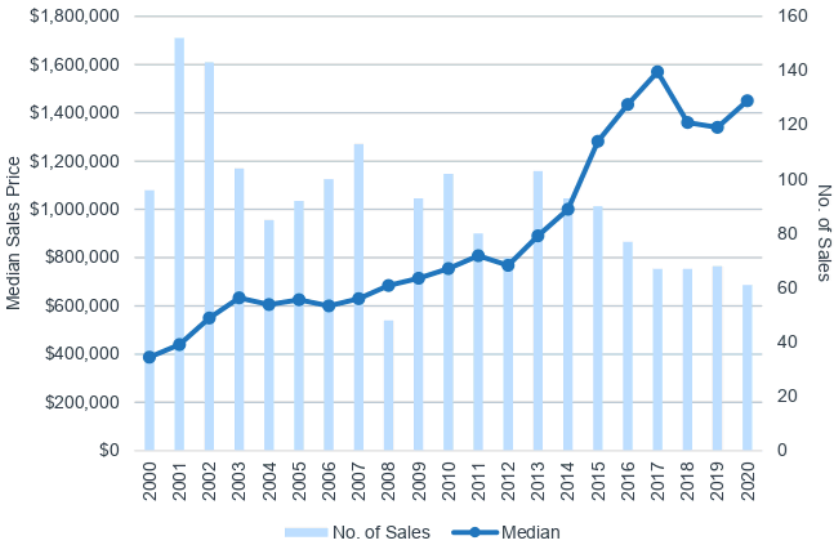
Pennant Hills is located 20 kilometres north-west of the Sydney CBD and is considered as one of the major commercial centres of Hornsby Shire Council, along with Hornsby and Carlingford.

Pennant Hills railway station is on the Northern Line of the trains network. Shops and the local Pennant Hills Library are located at the north-west of the railway line. Restaurants and cafes are located around Yarrara Road. Pennant Hills Marketplace, a local shopping centre, is located along Hillcrest Road. Residential houses are found in all areas in Pennant Hills, with recent modern apartments and office towers found along Pennant Hills Road. A significant commercial/industrial area can be found along Pennant Hills Road.

Residex suburb report (2021) indicates that there are 3,321 dwellings in the suburb of Pennant Hills, where 73% of total dwellings were separate houses, 10% were semi-detached dwellings, 11% were units. The average number of bedrooms per dwelling is 3.4 rooms.

In 2020, there were 61 sales, with a median house price of $1,450,000. The sales price ranged from $600,000 to $2,215,000.

Figure 3.4: Sales & Growth Chart, Pennant Hills (2000 – 2020)



Source: Price Finder (2021), AEC.

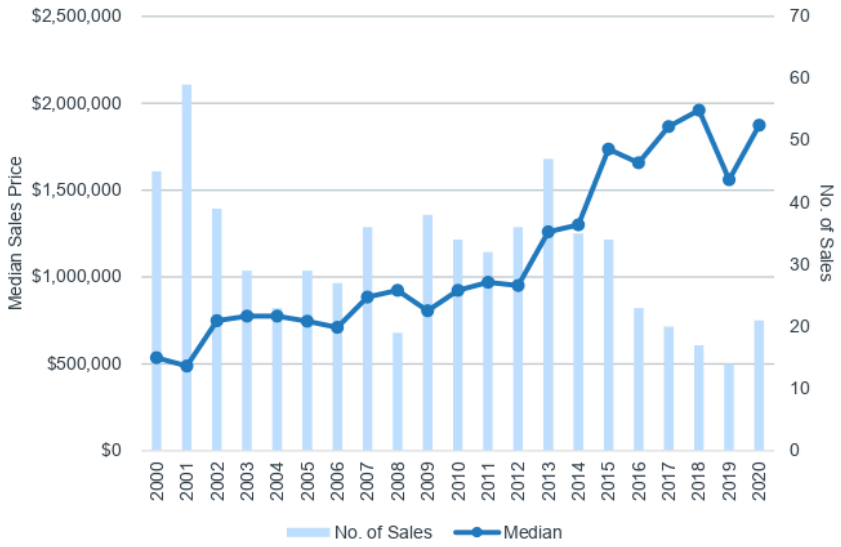
Cheltenham

Cheltenham is a small residential suburb 21 kilometres north-west of Sydney CBD. Cheltenham shares a postcode with Beecroft and is occasionally considered part of that suburb.

According to Residex (2021), there are 839 dwellings in the suburb, with 93% being separate dwellings, 1% semi-detached, and 6% of other dwelling types. ABS 2016 Census data indicates that the average number of bedrooms per dwelling in Cheltenham is 3.9 rooms, higher than the averages of NSW and Australia. Similarly, the average number of people per household is also higher than NSW and Australia, being 3.2 people.

In 2020, there were 21 sales, recording a median sales price of $1,873,000. The sales price ranged from $1,350,000 to $3,200,000.

Figure 3.5: Sales & Growth Chart, Cheltenham (2000 – 2020)



Source: PriceFinder (2021) AEC.

Sales Activity within the Study Area

With borrowing costs at historic lows, there has been a spike in the housing market over the past six months. Low borrowing costs, travel restrictions and the ability to work from home have been the most significant factors in driving the surge in the demand in houses across Australia.

In the last 12 months until March 2021, there were 17 sales in the Study Area, achieving a median sales price of approximately $1,787,000. This is higher than the median house prices of Beecroft, Pennant Hills and Cheltenham.

The majority of these sales were 5 bedrooms dwellings, with one instance of a vacant land sale observed at 35D Malton Road, Beecroft. The vacant land was 2,378 sqm in size, with 1,442 sqm zoned R2 and 936 sqm zoned RE1, and achieved a sales of $525.74/sqm (or $867.13/sqm of R2 zoned land).

The property at 78 Greenhaven Drive in Pennant Hills sold on 5th March 2021, achieving the highest sale price in the Study Area in the last 12 months of $2,7500,000.

Figure 3.6: Recent sales in the Study Area, March 2021

Source: PriceFinder/AEC.

APPENDIX B: LOT GROUPINGS METHODOLOGY

In analysing the various residential lots within the Study Area, we have examined the characteristics (size, shape, dimensions) of each lot to determine whether there is any further development potential by identifying residential subdivision controls per the DCP.

The Study Area has a minimum lot size requirement of 600 sqm, and a minimum lot width of 15 metres. Driveway access handles in low density residential areas should have a minimum total width of 3.5 metres (Table 6.4(a) of the DCP).

AEC has identified the lots that are greater than 1,200 sqm to determine which sites have the potential to be subdivided. It is understood that access ways are excluded from the calculation from minimum lot areas. As such, lots with an area of exactly 1,200 sqm would not result in complying subdivision but for the purposes of this exercise we have used this benchmark as an initial filtering.

The classifications for the purposes of this exercise include:

- Lots that are fully developed (single residential dwellings with no subdivision potential);
- Lots that have the potential to be subdivided (lots meeting the minimum lot size and width requirements with no other physical constraints identified);
- Lots that are unlikely to be subdivided (lots meeting the minimum requirements but has identified constraints such as terrestrial biodiversity, high quality improvements etc).

The phases of grouping the residential lots in classifications include:

- **Stage 1:** Preliminary filter based on size (lots greater than 1,200 sqm)
- **Stage 2:** Desktop Aerial Review, taking into the following factors:
  - Subdivision and density patterns
  - Existing Improvements and Remaining Developable Area (excl. RE1 zoned land)
  - Access considerations etc
- **Stage 3:** Environmental Constraints (including riparian buffer zones etc)
- **Stage 4:** Planning Constraints (other planning constraints that may be applicable).

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C Consultation Outcomes Report

ATTACHMENT 1 - ITEM 6

Byles Creek Planning Study – Discussion Paper

Consultation Outcomes Report

Client: Hornsby Shire Council
Date: 19 July 2021

ATTACHMENT 1 - ITEM 6

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1 Consultation Overview

The Byles Creek Planning Study (Planning Study) is a review of Hornsby Shire Council's current planning controls to evaluate their suitability in maintaining the environmental qualities on residential land within the Byles Creek corridor.

In developing the Byles Creek Planning Study, a whole-of-community consultation approach was adopted, in close collaboration with the local and broader community, landowners and community interest groups. The consultation process, led by Elton Consulting, sought to obtain views and feedback on the key environmental, economic, social and aesthetic attributes of the Byles Creek corridor. The consultation also sought to identify opportunities and barriers with the existing planning controls, opportunities for changes to the planning controls as well as other mechanisms for enhanced protection and management.

To assist with the consultation process, a Discussion Paper was prepared by Elton Consulting, in collaboration with Eco Logical Australia (land constraints and opportunities survey) and AEC Group (high-level economic implications analysis). The Discussion Paper provided contextual background and information on the Byles Creek Planning Study, summarised preliminary findings of a background review and site survey and presented some preliminary opportunities for changes to planning controls and other mechanisms. A series of questions were posed throughout the Discussion Paper to help guide the feedback sought as part of the consultation.

In addition to the Discussion Paper, an online digital survey was also prepared which provided further opportunity for landowners, community interest groups and the broader community to have their say, along with the ability to provide individual free form submissions. Property owners within the Study Area (

Figure 1) and nominated Community Interest Groups (**Table 1**) were invited to participate in 30-minute individual one-on-one online information and feedback sessions with a representative from Elton Consulting.

The consultation was further supported by Frequently Asked Questions (FAQs) to help inform stakeholders on the intent and objectives of the Planning Study. The Discussion Paper, online digital survey and FAQs were accessed via Hornsby Shire Council's 'Have Your Say' webpage.

The community and stakeholder consultation ran from 7th May to the 30th May 2021 inclusive.

The Discussion Paper and associated consultation process will be used to help inform the Byles Creek Planning Study and to help shape improved environmental outcomes for Byles Creek.

This Consultation Outcomes Report (this Report) presents information about the methods of consultation used and an analysis of the themes that have emerged from the consultation process. This process has provided insight into what values of Byles Creek are most important across the stakeholder groups, as well as highlighting the barriers with the existing planning framework and opportunities on how the current planning controls can be improved to better enhance and protect Byles Creek.

1.1 Consultation objectives

The key objectives of the community and stakeholder consultation were to:

- Raise awareness of intent and purpose of the Byles Creek Planning Study
- Consider and identify views relating to:
  - the key environmental, economic, social and aesthetic attributes of the Byles Creek catchment area; and
  - whether improvements / changes to current planning controls could enhance protection and management of the Byles Creek Catchment.
- Discuss the opportunities and barriers for any suggested changes to planning controls.
- Develop practical suggestions to maximise enhancement and protection of the Byles Creek catchment.
- Seek feedback on the preliminary findings and opportunities conveyed in the Discussion Paper.

1.2 How the community got in touch

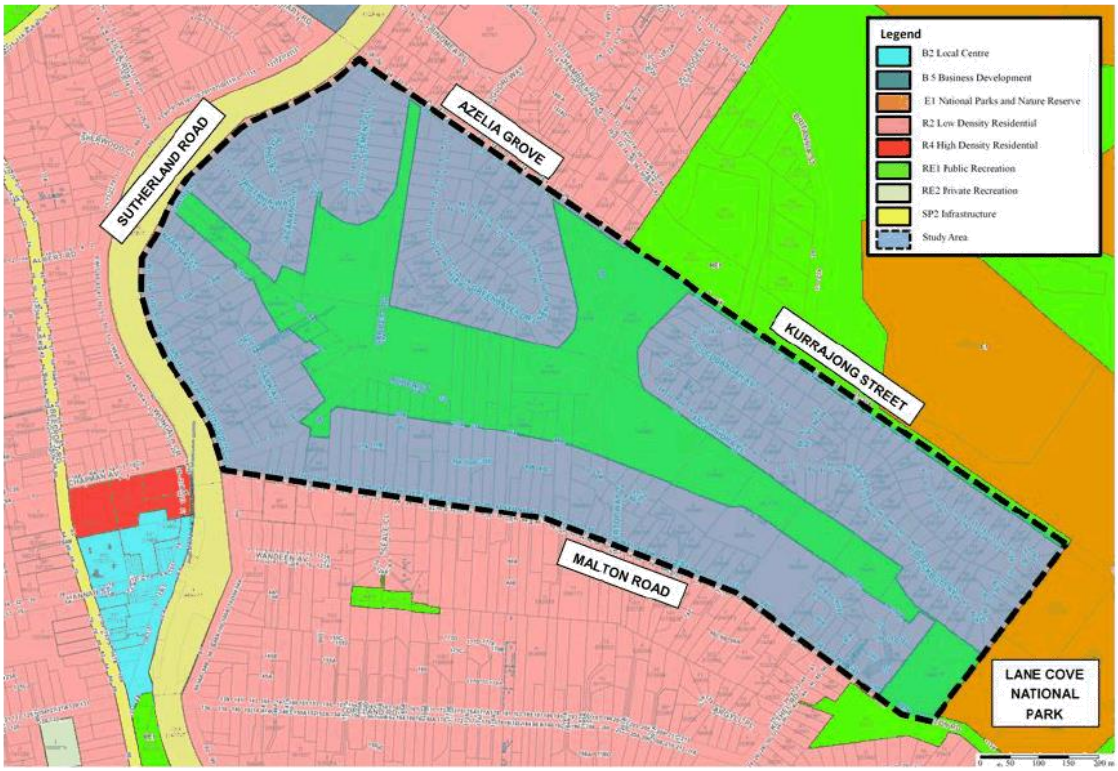
During the consultation period which ran from the 7th May to the 30th May 2021, we consulted with landowners, community interest groups and the broader community through various platforms summarised in **Table 1** below.

Many of the participants used the opportunity to provide feedback across the various platforms; i.e. stakeholders who participated in the drop-in online sessions also opted to lodge a submission in writing and / or competed the digital online survey.

Table 1 Summary of consultation platforms

	**Drop-in online information and feedback sessions** A total of twenty-six (26) participants registered and attended the online drop-in information and feedback sessions held specifically for property owners of residential land within the Study Area (**Figure 1**) and nominated community interest groups, including: > Byles Creek Valley Union Inc. > Beecroft Cheltenham Civic Trust > Save Beecroft Cheltenham Alliance > Powerful Owl Coalition > Birdlife Australia Powerful Owl Coalition > Pennant Hills Civic Trust The participants consisted of twenty (20) property owners and six (6) community interest groups. These sessions were held via an online via the video conferencing platform, 'Zoom'.
	**Written submissions** Fourteen (14) written submissions were provided to Council via email, five (5) during the prescribed consultation period and nine (9) prior to engagement commencing. Submissions were received from a variety of stakeholders, consisting of eight (8) property owners within the Study Area, three (3) identified as being part of community interest groups (including one property owner) and the remaining balance of three (3) submitters identified as being members of the broader community. All of the written submissions expressed general support for the intent and objectives of the planning study.
	**Digital online surveys** 90 x completed digital online surveys accessed via Council's "Have Your Say" webpage were provided during the prescribed consultation period. Participants of the digital online survey comprised thirty-nine (39) property owners within the Study Area, thirty (30) identified as being part of community interest groups (including fourteen (14) property owners) and the balance of twenty-one (21) identified as being members of the broader community. The survey largely compromised open ended questions to help guide the feedback sought. Questions were generally orientated around identifying and considering views relating to what they value most of Byles Creek and if changes to the current planning controls could enhance protection and management of the catchment.

Figure 1 Byles Creek Planning Study Area (Study Area)



Source: Hornsby Shire Council

2 What We Heard

2.1 Overview of themes raised

A number of common themes emerged throughout the consultation across all platforms and stakeholder groups, as summarised in the infographics provided in **Figures 2-5**. Many of these themes were combined in the submissions or discussed in the drop-in sessions.

These themes have been synthesised using the key questions posed throughout the consultation process and are discussed in more detail in the proceeding sub-sections of the Report.

Figure 2 What characteristics you value most about Byles Creek

Figure 3 What you think are the main impacts of development on Byles Creek

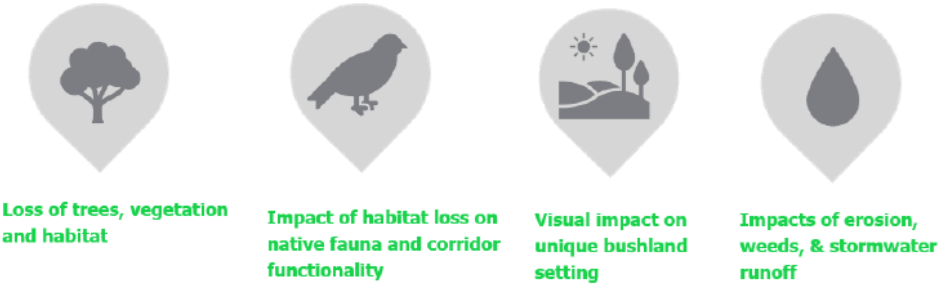
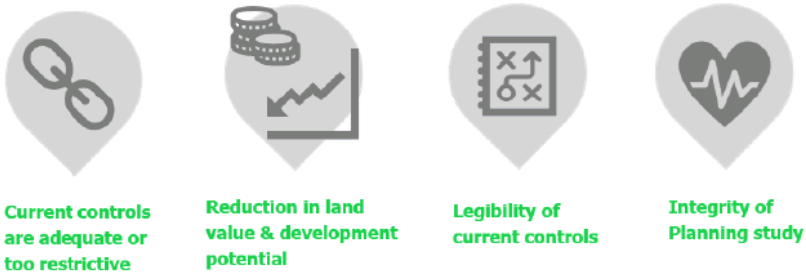


Figure 4 How you think we can improve impact of development on Byles Creek

Figure 5 What concerned you about the Planning Study



2.2 Key themes

The following sub-chapters provides a synthesis of the key themes which have emerged from the consultation across the various platforms.

2.2.1 What characteristics you value most about Byles Creek

All participants of the consultation (across the various platforms) expressed that they **valued the Byles Creek corridor** for a variety of reasons and communicated a desire for its protection, enhancement and maintenance. Many expressed that they felt privileged to live in the area surrounded by bushland. A significant proportion of landowners in the Study Area stated that they **moved into the area because they valued the bushland** setting.

Notably, this sentiment was also echoed amongst the participants who did not necessarily support the intended outcomes of Planning Study (or more specifically, the prospect of new planning controls, discussed in proceeding sub-chapters).

The **environmental constraint characteristics** within the Study Area, including the steep topography, bushfire affectation and riparian zones **were highlighted by a number of respondents to support their argument that the area is not suitable for residential development.**

Overall, the most valued characteristics of Byles Creek that emerged from the consultation included:

- **Flora:** A significant portion of participants indicated that they value the bushland including the native canopy trees and vegetation which occur in the area and highlighted their necessary preservation. Frequent reference was made to the critically endangered Blue Gum High Forest, the regionally significant Coachwood and locally significant Blackbutt Gully Forest, as well as the canopy trees and native wildflowers more broadly.
- **Fauna:** The majority of participants expressed that they valued the native fauna which occur in the area. Specific references were often made to various native fauna, particularly the abundant variety of birdlife. Many were more specific in their responses and referenced the endangered Gang-Gang Cockatoo, threatened Powerful Owl and the Commonwealth Listed Dural Land Snail. The interactive experiences with the native animals was also mentioned on a number of occasions, particularly in the online drop-in sessions, including the birdlife, frogs, snakes, wallabies and echidnas.
- **Environmental and ecological value:** Many of those consulted supported the environmental and ecological value of Byles Creek including the general unique terrestrial biodiversity, diverse nature of the habitat, the importance of the ecosystems and the flora and fauna which occur in the area. Responders highlighted the importance of the Byles Creek unique ecosystem to sustain the threatened and endangered species and the diversity of flora and fauna which occur in the area. Many participants felt that the ecological values of Byles Creek needed elevating through strengthening the planning controls.

- **Biodiversity corridor:** Reflecting the sentiment towards the environmental and ecological values above, there was also strong representation of the importance of Byles Creek as a functioning biodiversity corridor and key to providing connectivity to other areas of key habitat (such as Lane Cove National Park and Pennant Hills Park) for the movement of native wildlife. It was also mentioned that Byles Creek provides important refuge for native wildlife in the event of bushfires in Lane Cove National Park or other areas of connecting bushland.
- **Sustainability**: Sustainability values, such as the natural cooling benefits afforded by the dense canopy and understorey cover assisted by the topography were also highlighted on number of occasions. These attributes were considered by many landowners to creates a cooler micro-climate, benefiting their amenity. Property owners and members of the broader community also noted that the Byles Creek corridor helps to promote resilience against climate change through these cooling benefits and where it enables distribution of species through its connectivity functions, linked to the biodiversity corridor theme raised by numerous participants.
- **Waterway and catchment:** A number of participants referred to Byles Creek as a significant natural waterway and riparian corridor, pivotal to the local ecosystem. It was frequently noted that Byles Creek forms an important catchment for several tributaries, including Delvin's Creek, Land Cover River and the Sydney Harbour Catchment.
- **Scenic amenity:** Many respondents, particularly landowners, highlighted that they valued the scenic amenity and aesthetic value of the bushland setting, supported by the steep topography allowing for expansive bushland views. This was expressed during both the drop-in sessions as well as in writing in the survey and written responses.
- **Recreational value:** The recreational value offered by Byles Creek though its walking tracks was considered a valuable characteristic by many, including landowners within the Study Area and members of the broader community. There was desire expressed by some respondents to expand or formalise the existing walking track, and it was noted in the drop-in sessions that the investigation of a formalised walking track is being undertaken as part of a separate strategy and out of the scope of the Planning Study.
- **Heritage:** A number of participants conveyed that the heritage value and historical importance of the area was a significant attribute of Byles Creek, including the legacy of Marie Byles. A number of respondents, particularly members of community interest groups, took the opportunity to provide detailed and comprehensive historic information relating to Byles Creek in their written submissions for contextual consideration in the Planning Study.
- **Mental health and wellbeing:** Byles Creek and its valued contribution to health and wellbeing was a recurring theme raised by a large number of participants, predominantly comprising of landowners within the Study Area. This was often linked to the impacts of COVID-19 and the resurgence of open space appreciation and the contribution of the natural environment to mental and physical health and wellbeing.

2.2.2 What you think are the main impacts of development on Byles Creek

Throughout the consultation and across all stakeholder groups, the **vast majority of respondents considered the most significant impact of residential development on Byles Creek to be loss of canopy trees**. Linked to this concern was the **loss of the abundance of native animals and their key habitats**, particularly the evident disappearance of the endangered Gang Gang Cockatoo and other native birdlife.

Other key impacts which emerged from the consultation included the **impact of increased stormwater runoff** on water quality, weed **infestation, erosion and bushfire constraints** requiring Asset Protection Zones linked to the subsequent loss of trees. Concerns for the impact of domestic animals on wildlife was also raised by a smaller proportion of participants.

These and other key issues, are summarised below.

- **Loss of canopy trees**: A significant number of respondents indicated that the biggest impact of residential development on the Byles /creek corridor to be the loss of mature canopy trees. This issue was seen to be result of the cumulative impacts of development over a significant period of time. It was often added that this loss was considered to be result of clearing to accommodate inappropriate development, (particularly as result of recent and historic subdivisions), illegal tree pruning and / or removal, flexible application of planning controls and a lack of post development approval regulation (i.e. compliance with conditions of consent during construction).
- **Loss of native fauna:** Participants frequently indicated that they are concerned for the loss of native fauna occurring in the area, and many have indicated that they have experienced the loss of native fauna occurring in the area, including less frequent sightings of fauna such as the Gang Gang Cockatoo. Many indicated that they considered this impact a direct result of new development and subsequent land clearing and loss of habitat.
- **Loss of key habitat**: Many respondents linked the apparent loss of native fauna to the loss of habitat in the Byles Creek corridor as result of new developments. Many were specific in their responses, and referenced specific habitat features such as hollow bearing trees which form important habitat for the Powerful Owl and Gang Gang Cockatoo, and understorey and ground cover vegetation which provides important foraging, roosting and nesting opportunities for native fauna habitat for wildlife such as small birds, reptiles and invertebrates.
- **Bushfire management:** Asset Protection Zones (APZs) and clearing associated with bushfire management requirements for new development and the subsequent loss of significant vegetation was a strong recurring theme raised by a large number of participants across all stakeholder groups. The constraint of many residential properties falling within the Bushfire Attack Level (BAL) category "Flame Zone" was raised on a number of occasions to support this concern. It was highlighted that any development in the "Flame Zone" will require the removal of bushland, no matter how well planned the development.
- **Visual impact of the bushland setting:** Many respondents indicated that new developments in the area is leading to a loss of the bushland character and the visual impact on the natural landscape setting of Byles Creek.
- **Weed infestation:** A large proportion of participants considered weed infestation in the Byles Creek corridor as a key issue and many considered this to be a result of urbanisation and poor weed management on both private properties and the adjoining land zoned RE1 – Public Recreation comprising the core of the Byles Creek corridor.
- **Increased stormwater runoff:** Increased stormwater runoff and sedimentation of the Byles Creek waterway from roads (attributed to poor drainage), increased hard surfaces and insufficient deep soil landscaping as result of new development was raised on a number of occasions throughout the consultation process.
- **Erosion:** Many participants considered erosion a key impact in the Byles Creek corridor. This issue was often linked to the issue of increased stormwater runoff as result of tree loss which has destabilised the banks of the Byles Creek waterway. Exacerbating the occurrence of erosion was also linked to excavation, loss of natural features such as rick outcrops, cut and fill and general soil disturbance as result of development.
- **Domestic animals:** Although not a direct impact of residential development, many participants (largely landowners) raised concern for the impact of domestic animals. This was linked predominantly to domestic cats roaming into the bushland and preying on native wildlife such as snakes, lizards and small birds. Many added that there had been more occurrences of fox sightings and linked this to the loss of native fauna.

2.2.3 How you think we can improve the impact of development on Byles Creek

67% of the online survey respondents indicated that they considered **reducing development opportunities on residential lands an appropriate way to protect and enhance the environmental values of the Byles Creek corridor.**

A smaller proportion of survey respondents **(5%) did not want to see any changes to planning controls**.

Overall, there was a **strong level of support for the intent and objectives of Planning Study**. This was expressed across all stakeholder groups, including property owners, community interest groups and the broader community. Many stakeholders (particularly landowners and community interest groups) indicated throughout the consultation that they have advocated for stronger planning controls and land acquisition for many years.

Connected to this sentiment was an identified need to protect and enhance the Byles Creek corridor from further fragmentation as result of residential development through **strengthening the planning controls**, particularly in the **legislative planning framework** (such as the *Hornsby Local Environmental Plan 2013*).

There was also a **strong call for improved enforcement of planning controls and post development approval regulation**.

Education and engagement of landowners and the broader community through various programs was considered important by a number of participants to support acceptance of any proposed planning changes and to ensure biodiversity is valued, connectivity is protected, and bushland is enhanced.

Although outside of the scope of the Planning Study, **land acquisition of certain lots** within the Study Area was a strong recurring theme amongst landowners.

The general sentiment across the stakeholder groups was that a **multi-pronged / multi-faceted approach** incorporating various planning and non-planning mechanisms is needed to protect and enhance Byles Creek.

The key emerging themes in relation to opportunities and barriers in the planning framework is discussed in the following sub-chapters.

Statutory Planning

A large proportion of landowners, community interest groups and members of the broader community considered that planning controls applicable to residential land needed strengthening by way of incorporating changes into the *Hornsby Local Environmental Plan 2013* (LEP).

A significant proportion of participants (including landowners and community interest groups) supported the opportunities presented in the Discussion Paper for strengthening the statutory planning controls such as implementation of Environmental Zoning ('E-zoning') which set clear environmental objectives. The opportunity for increasing the minimum lot size was also well received by many respondents, inducing landowners. These and other opportunities for the statutory planning framework put forward are summarised as follows:

- Some participants (including landowners) indicated that that the current zoning (R2 Low Density Residential) was unsuitable for development due to the steep topography, presence of riparian zones and legislated terrestrial biodiversity areas, and that a zoning of E3 – Environmental Management may be more appropriate. Alternatively, some participants considered E4 -Environmental Living to be most appropriate zone to accommodate both residential development and enhanced environmental outcomes, whilst others considered that either the E3 or E4 zones would provide an appropriate level of protection beyond what currently exists. A smaller proportion suggested the higher levels of protection afforded by the E2 – Environmental Conservation zone. It is noted that this zone is reserved for areas with high ecological value and which provides the highest form of protection outside of National Parks zoning (E1).
- It was recognised by stakeholders that recent and historic subdivisions have had a significant impact on the Byles Creek corridor, particularly the resultant clearing of vegetation to accommodate new development and associated access (such as driveways). The opportunity identified in the Discussion Paper to investigate

increases to the minimum lot size was supported by a number of participants, including landowners. Many other participants sought a blanket prohibition of subdivision in the area. It was generally considered by participants that the current permitted lot size is too small for the area, linking this to its environmental and ecological significance.

- The opportunity identified in the Discussion Paper to map Riparian Corridors with a supporting Clause in the LEP was supported by a number of participants, particularly members of community interest groups. Some were more specific in their responses, indicating that an increase to the provisions for the riparian buffer zones in Hornsby DCP, from 10m to 30m, should be implemented.
- Expansion of the current Terrestrial Biodiversity mapping overlay was also presented as an opportunity by numerous stakeholders, and that this mapping should be supplemented by site specific controls.
- A smaller portion of participants suggested that a reduction of floor space area / implementing a maximum floor space on residential lands in the Byles Creek Corridor was an opportunity worth investigating. It was added by one participant that major development impediments e.g. riparian zones should be deducted from the site area when calculating floor space, similar to the provisions of LEP Clause 4.5 (4).

Development Control Plan (DCP)

Although the majority of respondents felt that the statutory planning controls required the most focus to better protect and enhance Byles Creek on private land, a variety of suggestions for improving the planning controls in the DCP emerged from the consultation. These included:

- More robust and targeted /site specific controls to mitigate fragmentation of the Byles Creek Corridor, particularly for land which provides an immediate interface with Byles Creek. This was linked to the opportunity raised by a number of participants for strengthening the Biodiversity section of the DCP, particularly with the inclusion of clauses that prioritise the environment and biodiversity for development on Environmentally Sensitive Lands / land mapped as Terrestrial Biodiversity.
- A review and reduction of building footprint, building envelope and allowable site coverage provisions was a suggested opportunity identified by a number of participants.
- Many participants considered that offsetting the loss of trees and vegetation required in the current DCP planning controls has not been implemented on a like for like basis. It was often added that canopy tree loss is being offset inappropriately by shrubs and grasses or are offset by trees and vegetation which does not support biodiversity or provide habitat value to native fauna.
- It was also suggested that controls be put in place to restrict development near the riparian zone, retain the topography and natural outcrops, wildlife friendly fencing to enable passage of native fauna etc.
- The case studies presented in the Discussion Paper were generally supported, including the implementation of a mapping overlay and accompanying planning controls based on the 'Greenweb' model adopted by Sutherland Shire Council and Ku-ring-gai Councils. Many indicated that not just one but many of the mechanisms highlighted in the case studies should be considered.
- A smaller proportion of participants suggested that planning controls could be improved with a strategic focus on weed eradication and by-laws excluding domestic dogs and cats from bush-land.

Planning control application and post approval regulation

Better enforcement of planning controls during both the assessment process and post-approval (enforcement of conditions of consent and environmental protection plans etc) was a strong recurring theme which emerged from the consultation across all stakeholder groups. Some participants added that strengthening the wording of DCP controls may reduce flexibility of the controls and strengthen their consideration as part of the development assessment process. It was also suggested that stronger penalties for illegal removal of vegetation be administered.

Another key concern raised throughout the consultation was the issue of applications refused by Council and/or the Local Planning Panel for inappropriate being approved on appeal in the Land and Environment Court.

Community education and engagement

It is apparent from the stakeholder engagement outcomes that many residents have chosen to live in the Byles Creek catchment area because of the amenity afforded by the bushland setting. Notwithstanding, it was expressed by a number of stakeholders that some residents could be made more aware of how to better protect and enhance the corridor within their properties. Creating more community awareness through education programs administered by Council was an opportunity suggested by a large number of participants across the stakeholder groups. It was also acknowledged that education and engagement is fundamental to obtaining community 'buy-in' and should be undertaken in parallel with any changes to planning controls.

It was also indicated by landowners and members of the broader community that the current tree preservation controls may be misunderstood, resulting in confusion and unauthorised tree removal. Many participants added that this could be mitigated through better community education and availability of resources to assist with navigating the tree preservation requirements in the DCP.

Provision of opportunities for landowners and the broader community to get involved in the care of the local environment was also an opportunity identified in the consultation. It was suggested this include incentives such as provision of free gardening and biodiversity advice, planting programs, Citizen Scientist Projects and bushcare volunteer groups. Provision of a formalised walking track to improve access and user experience and custodianship was also suggested to support this objective.

Land acquisition

Although beyond the scope of the Planning Study, land acquisition of certain lots within the Study Area was a strong focus across the stakeholder groups, including landowners, community interest groups and the broader community.

Alternative approaches employed by other Councils

It was noted by some participants that introducing an Environmental Land Acquisition Levy to protect ecologically significant land is being undertaken by numerous Councils (i.e. Noosa Shire Council) to ensure protection / connectivity of significant ecological areas of high biodiversity value and this opportunity should be further investigated as part of the Planning study.

There were some examples of alternative approaches that the participants felt should be considered, including the Crommelin Native Arboretum in Pearl Beach (Central Coast) as a case study to improve existing public open space at the residential interface. An international example of sustainable development from Singapore (the Singapore Greenplan 2030) was also mentioned as a case study worth examining as part of the Planning Study.

2.2.4 Concerns about the Planning Study

A smaller proportion of landowners who participated in the consultation **did not want to see any changes to planning controls**. Some landowners considered the planning controls to be either **sufficient or already too rigorous and didn't want to see further restrictions**. One landowner also indicated that they considered the **minimum lot size of 600m² was adequate for the area.**

Linked to this sentiment included **concerns for economic impacts on land value** as result of any new development controls reducing development potential of their land, as well as the **importance to protect property and human life from bushfire and falling trees, tree roots etc**

A small proportion of landowners also found the **current tree preservation controls overly prescriptive and difficult to navigate** and wanted these simplified rather than expanded.

Notwithstanding these concerns, the smaller proportion of participants who did not support any changes to planning controls expressed that they valued the environmental and socio-economic values offered by Byles Creek and expressed desire for it to be maintained.

The key concerns raised by property owners in relation to the intended outcomes of the Planning Study are summarised in the following sub-chapters.

Current planning controls are considered either adequate or too restrictive

Some landowners consulted considered that the planning controls are either adequate or too rigorous and did not want to see further restrictions on landowners.

It was suggested that there be more focus on the management and enhancement of the non-residential zoned land (i.e. the core area of the Byles Creek corridor zoned RE1 Public Recreation). It was expressed by one property owner that new controls and possible further restrictions on a small area do not benefit the wider community.

It was considered that changes to land zoning would be misplaced as the area is already a significantly developed residential area and would only affect a small number of properties which are not already yet developed. Linked to this sentiment, zoning changes and stricter controls impacting only a few properties was perceived as 'overreach' and not in the interest of the wider Hornsby Shire community.

Some concerns raised by individual property owners expressed disparity between the voices of landowners and interests of the community groups whom may not be directly impacted by any changes to planning controls.

There was a recommendation that there should be less focus on controls and more focus on building a sustainable social fabric to support a better environmental outcome.

Bushfire protection and risk

The impact of current controls on bushfire protection and safety to human life and property (i.e. difficulty clearing trees adjacent to existing dwellings where there are concerns of falling limbs/trees) was a less frequently discussed point raised by property owners. It was considered that development of properties adjoining the corridor is already constrained by the existing tree preservation controls and the bushfire risk management requirements and did not warrant further restrictions.

Property values

Economic impacts on property values as result of planning changes was a concern expressed by a smaller proportion of landowners. This concern was expressed by a small proportion of individual landowners who were consulted during the drop-in sessions as well as conveyed in writing via the online survey.

Reduction in development potential

Concern was raised, specifically by a small number of landowners, that changes to planning controls may impact upon the development potential of their property. They indicated that, as the area is already zoned for low density residential (R2), they did not want to see any further decreases in development potential of their land.

Particularly in the online drop-in sessions, some landowners indicated that they were confused about the outcomes of the Planning Study and requested clarity on what the overall process meant for them and how it would directly impact on their land values and development potential of their land.

Land Acquisition:

It was suggested by a portion of the landowners opposed to new planning controls that Council should consider converting the land of key concern to public land through market acquisition and compensate owners at fair market value.

Tree protection controls

The legibility of the current tree preservation controls in the DCP were considered by some landowners as confusing to navigate in their current form and were concerned that further controls would only exacerbate this issue. Some thought the tree preservation controls were already too prescriptive and detailed and considered them onerous in nature, particularly when seeking to remove trees which they felt did not contribute to the ecological values of Byles Creek (such as exotics or dead or dying trees). Many felt that the overly prescriptive nature of the tree preservation controls contributed to the illegal removal of trees on private property, unknowingly or otherwise.

Integrity of the Planning Study

Many participants queried the intent of the Planning Study. There was a small amount of commentary that participants had been consulted on numerous occasions over the years in relation to various studies and strategies for Byles Creek and thus questioned the integrity of Councils intentions on this occasion. This sentiment was expressed particularly by participants who considered land acquisition as the best and/or only solution to enhancing and protecting Byles Creek.

A smaller proportion of participants considered the Planning Study to be a waste of Council revenue for this reason and for the reasons linked with their sentiment that the planning controls were already sufficient and did not require change.

3 Concluding Summary

Many landowners and members of community interest groups who had attended one-on-one sessions appreciated the discussion with consultant and council representatives. Many participants indicated that they were appreciative of the opportunity to provide feedback on the Planning Study was also expressed in the written and online survey submissions.

The outcomes of the consultation across the stakeholder groups indicated general support for the intent and objectives of the Byles Creek Planning Study.

The majority of participants indicated that the planning controls were not doing enough to protect Byles Creek and considered that a reduction of development is considered appropriate to mitigate impacts.

The key themes which emerged from the consultation process included:

» Loss of canopy trees, vegetation and habitat

» Impact of habitat loss on native fauna and corridor functionality

» Impacts of erosion, weed infestation and increased stormwater run-off

» Visual impact on the bushland setting.

From these themes, some key opportunities to better protect and enhance the environmental qualities of Byles Creek emerged. These include

» Support for strengthening statutory planning controls through rezoning and increasing minimum lot size in the LEP coupled with enhancement and better enforcement of planning controls in the DCP

» Support for community education programs and engagement in parallel with implementation of new planning controls

» Acquisition of certain land within the Study Area.

Despite the general support expressed for the intent and objectives of the Planning Study, there were concerns raised by several landowners that the current planning controls are either sufficient or already too rigorous and therefore did not want to see any further restrictions. This sentiment was expressed in writing across both the digital survey submissions and communicated in the drop-in sessions

The divergent views expressed by a smaller proportion of landowners included concerns for:

» Impact of new controls on property values and development potential of their land

» Further restrictions on tree removal for bushfire and asset protection and associated risks to human life and property

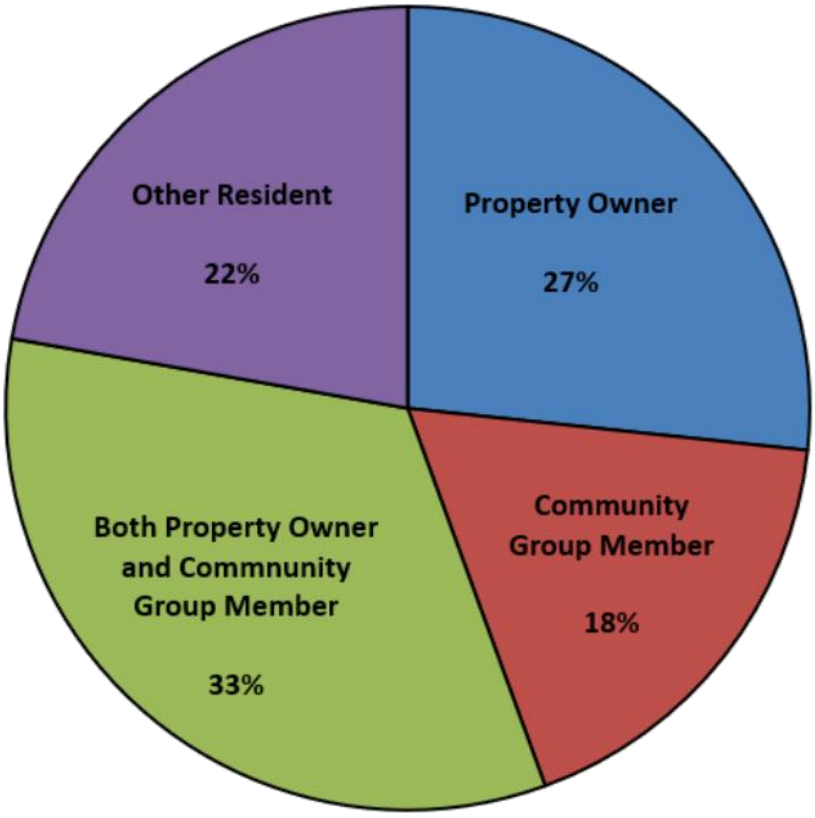
ATTACHMENT 1 - ITEM 6

Appendices

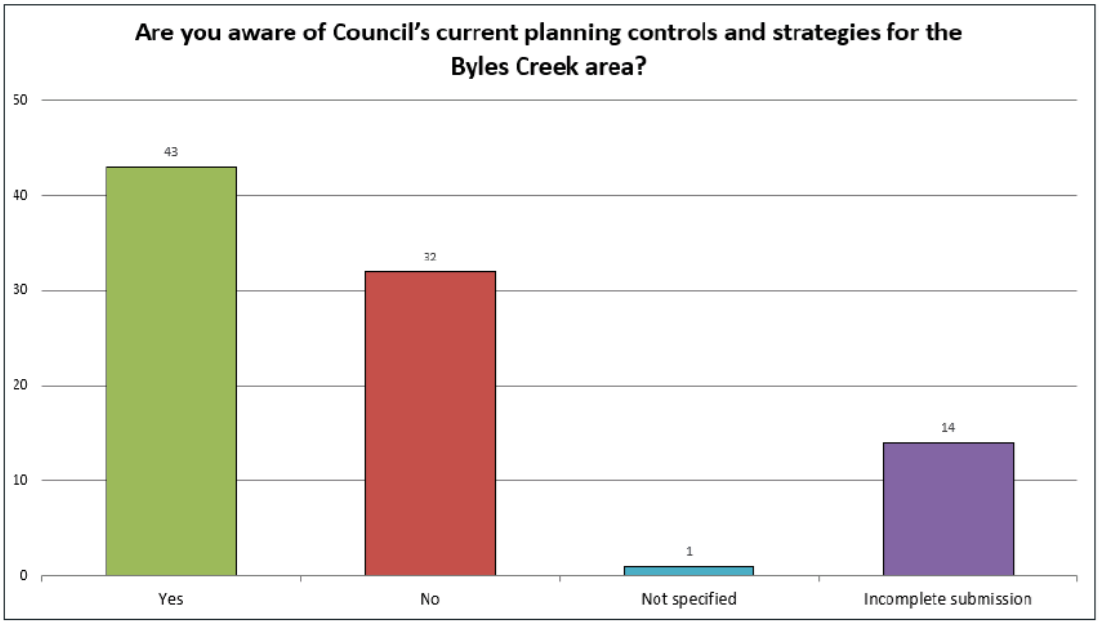
A Quantitative analysis of survey outcomes

A Quantitative analysis of survey outcomes

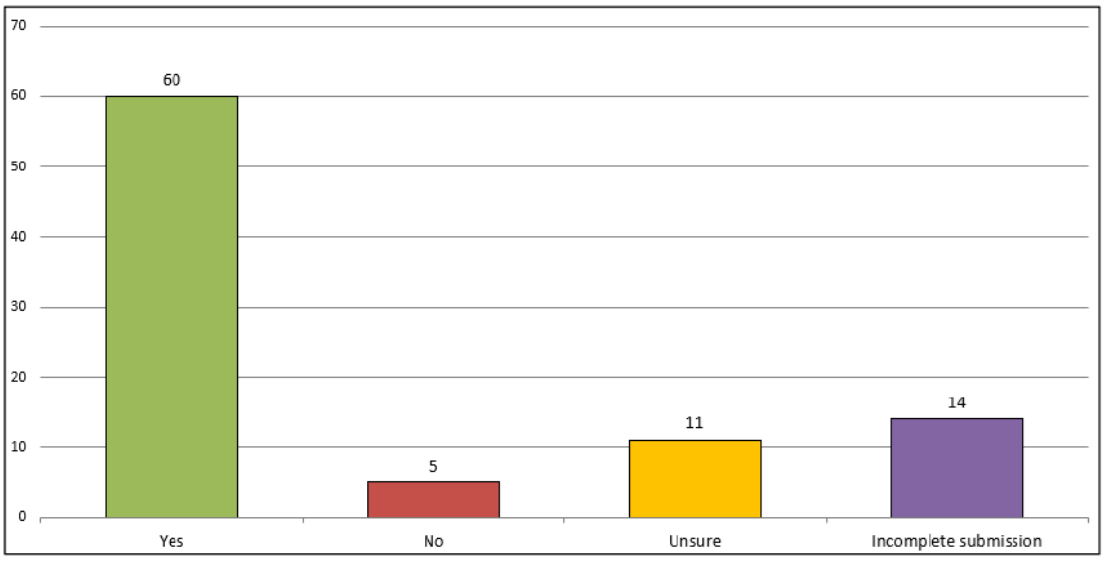
Digital survey participant profile



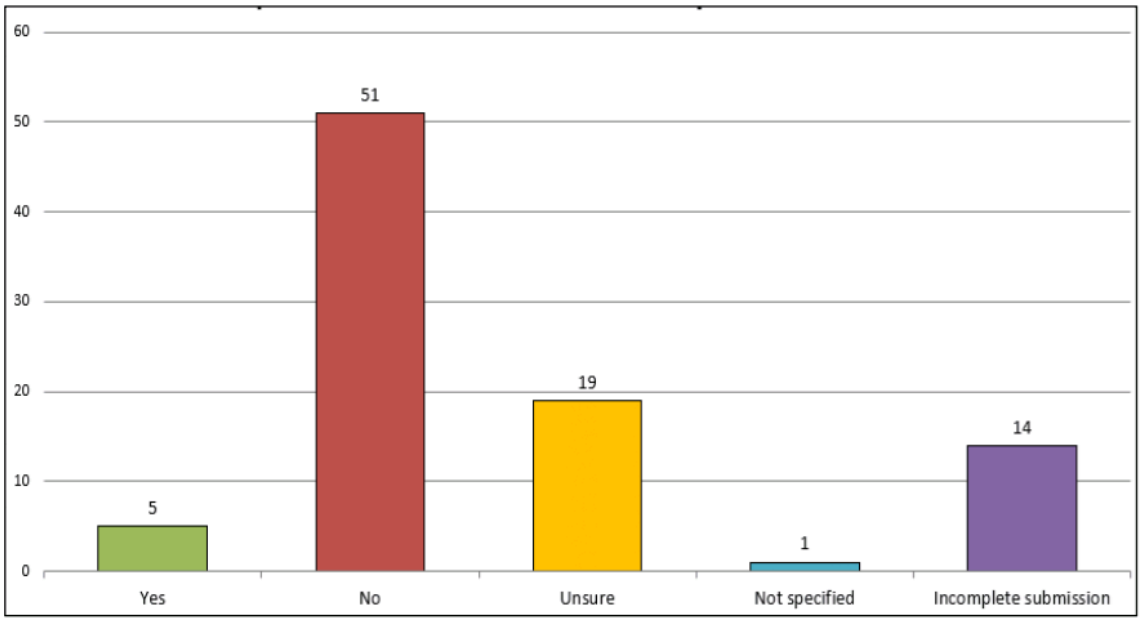
Survey Q5 - *Are you aware of Council's current planning controls and strategies for the Byles Creek area?*



Survey Q6 – *Is reducing development opportunities on residential lands and appropriate way to protect and enhance the environmental values for the Byles Creek area?*



Survey Q7 ***– Do you think the current planning controls for residential properties do enough to protect the environmental qualities within the Byles Creek Area?***



ATTACHMENT 1 - ITEM 6

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Implementation Action Plan – Byles Creek Planning Study – May 2022		
Policy Affected	**Recommendation**	**Comment**
HLEP	Recommendation 1 - Rezone land within the study area currently zoned R2 Low Density Residential to C4 Environmental Living by amending the 'Land Zoning Map' identified in Clause 2.2 of the *Hornsby Local Environment Plan 2013*.	Implement via Planning Proposal to DPE
	Recommendation 2 - Increase minimum lot size for land proposed to be zoned as C4 Environmental Living to 40 hectares by amending the 'Lot Size Map' identified in Clause 4.1 of the *Hornsby Local Environment Plan 2013*.	
	Recommendation 3 - Amend wording of the Clause 4.1 objectives within the *Hornsby Local Environment Plan 2013* to protect and enhance existing bushland and significant native vegetation.	
	Recommendation 4 - Introduce a new Local Provision Clause – Riparian Land into the *Hornsby Local Environment Plan 2013* and provide supporting riparian corridor mapping.	
N/A – aligns with priorities and actions of LSPS and other local strategic planning documents.	Recommendation 5 - Community engagement programs targeting the Study Area	Implement as per Strategy recommendation and in conjunction with priorities and actions of LSPS, Sustainable Hornsby 2040,and Biodiversity Conservation Strategy.
HDCP	Amend DCP to reference and align with amended HLEP controls for the study area, including land use zone application and local clause – riparian land.	Implementation subject to Gateway Determination of associated Planning Proposal

ATTACHMENT 2 - ITEM 6