Byles Creek Planning Study

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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).

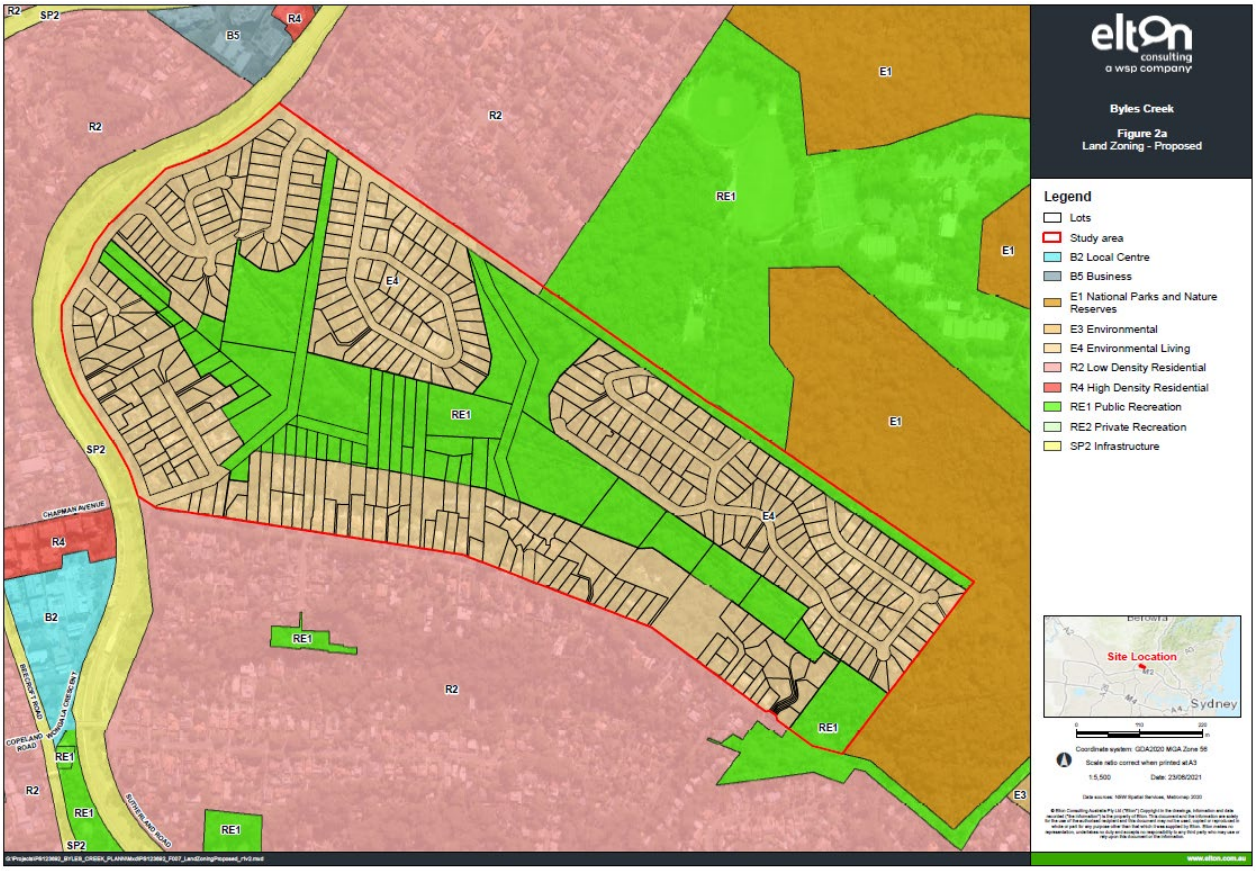
» Accordingly, the recommendations provided in the Planning Study are focused on implementation of new land use initiatives within the framework of the current LEP, supported by supplementary controls associated with the land in both the LEP and the DCP.

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).

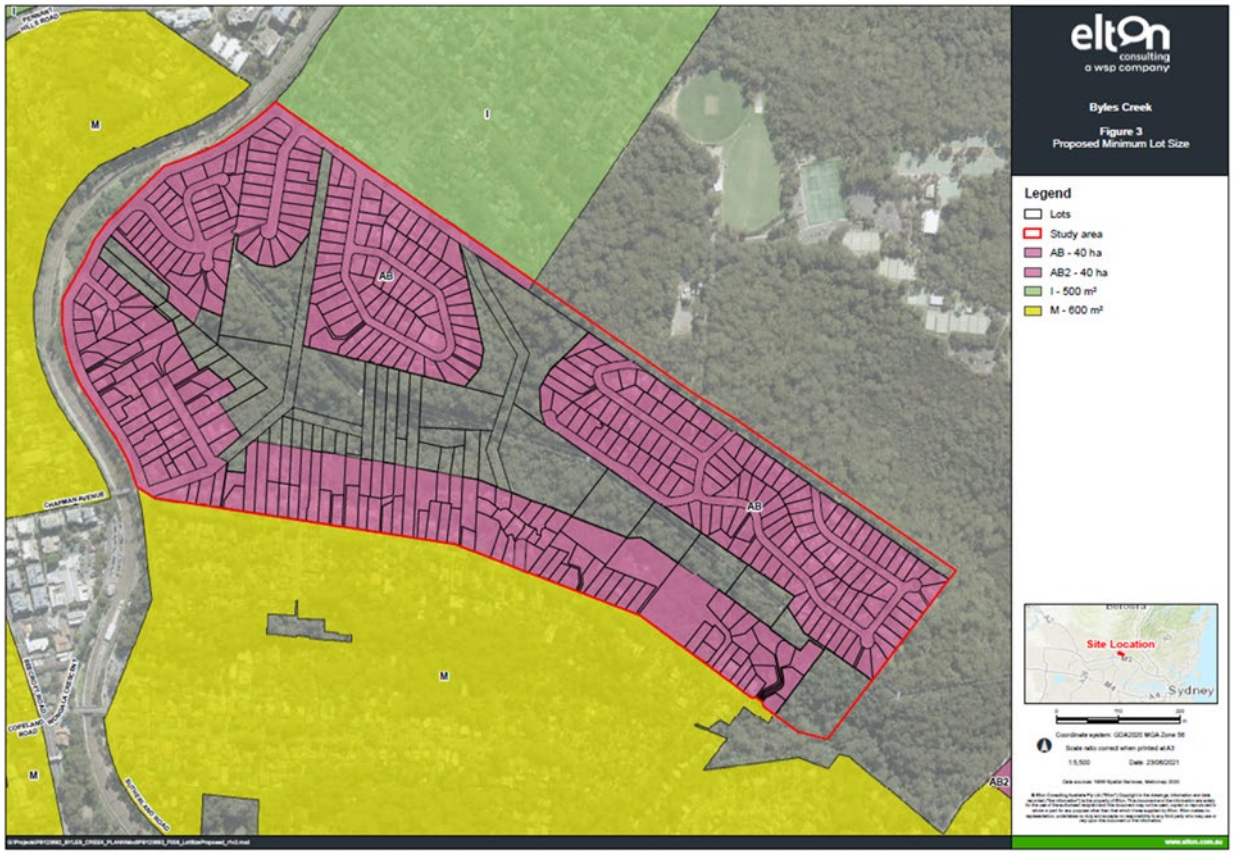
Economic Implications

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

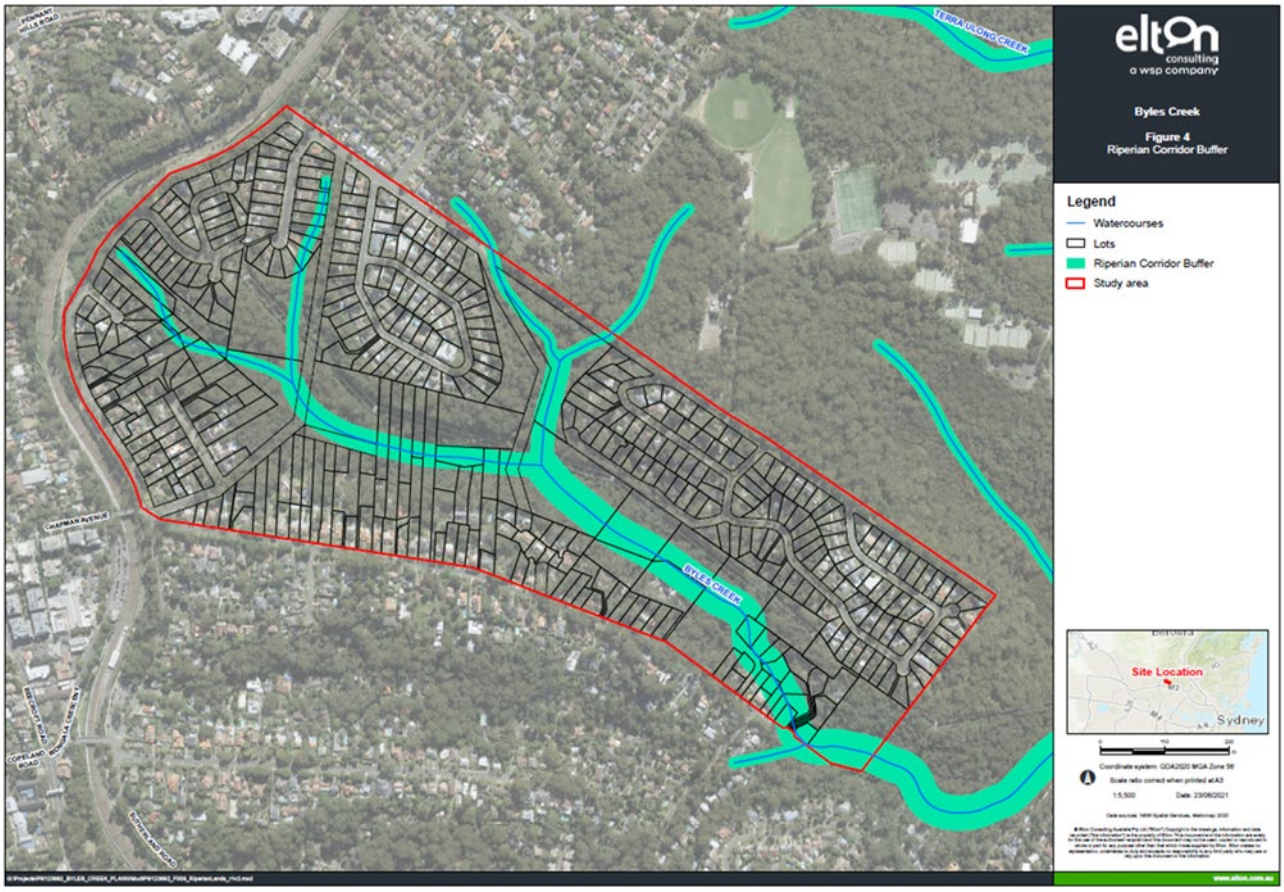
Recommendation 3 Strengthen the wording of Clause 4.1 objectives with the LEP to protect and enhance existing bushland and significant native vegetation.

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.

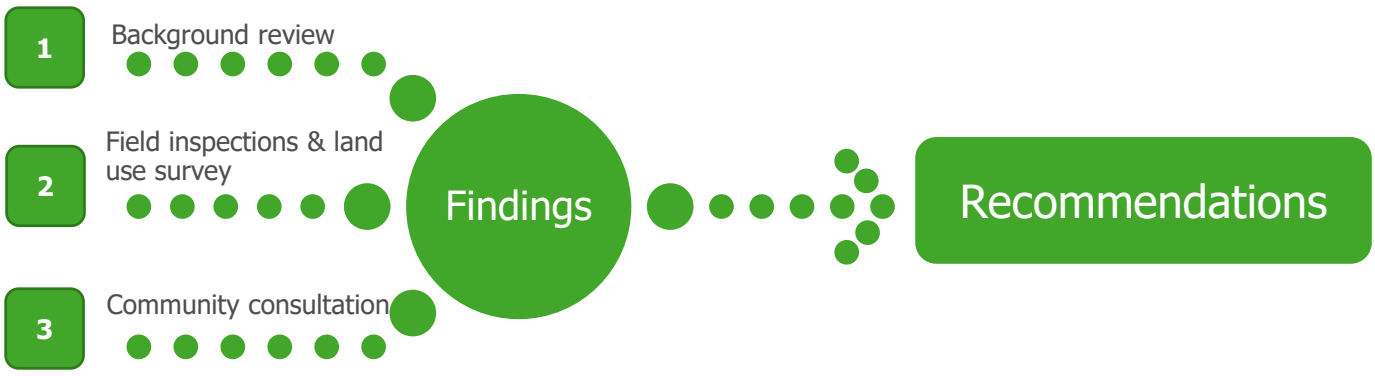
The Planning Study accounts for the significant landscape within the Byles Creek corridor, while at the same time, reviewing how residential properties surrounding the area can minimise impacts on the natural environment.

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.

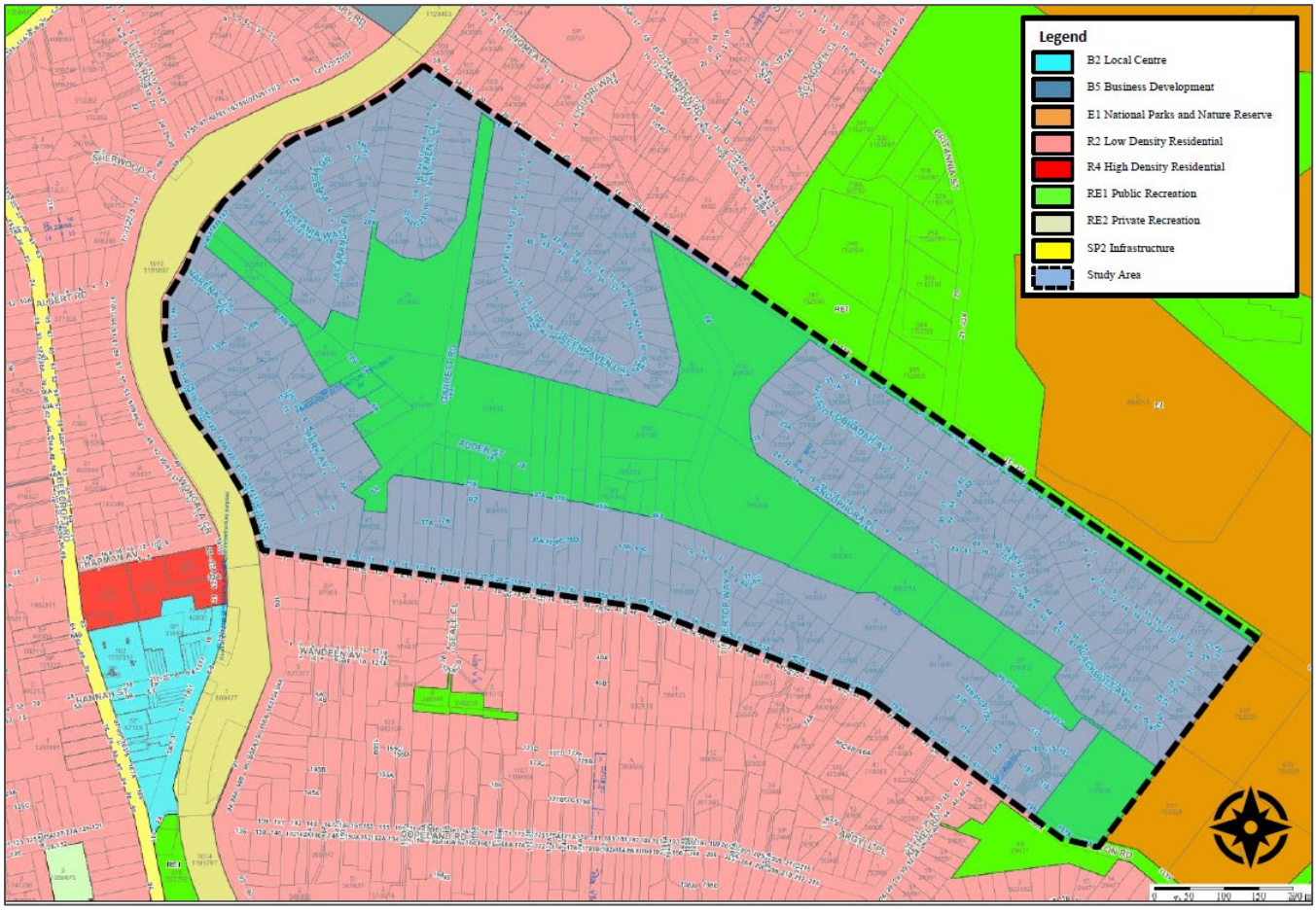
The Byles Creek corridor has been identified as environmentally significant due to the unique environmental, social and aesthetic values of the area. The corridor provides connectivity between the vegetation along Byles Creek and Lane Cove National Park. The connectivity of this corridor ensures the 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

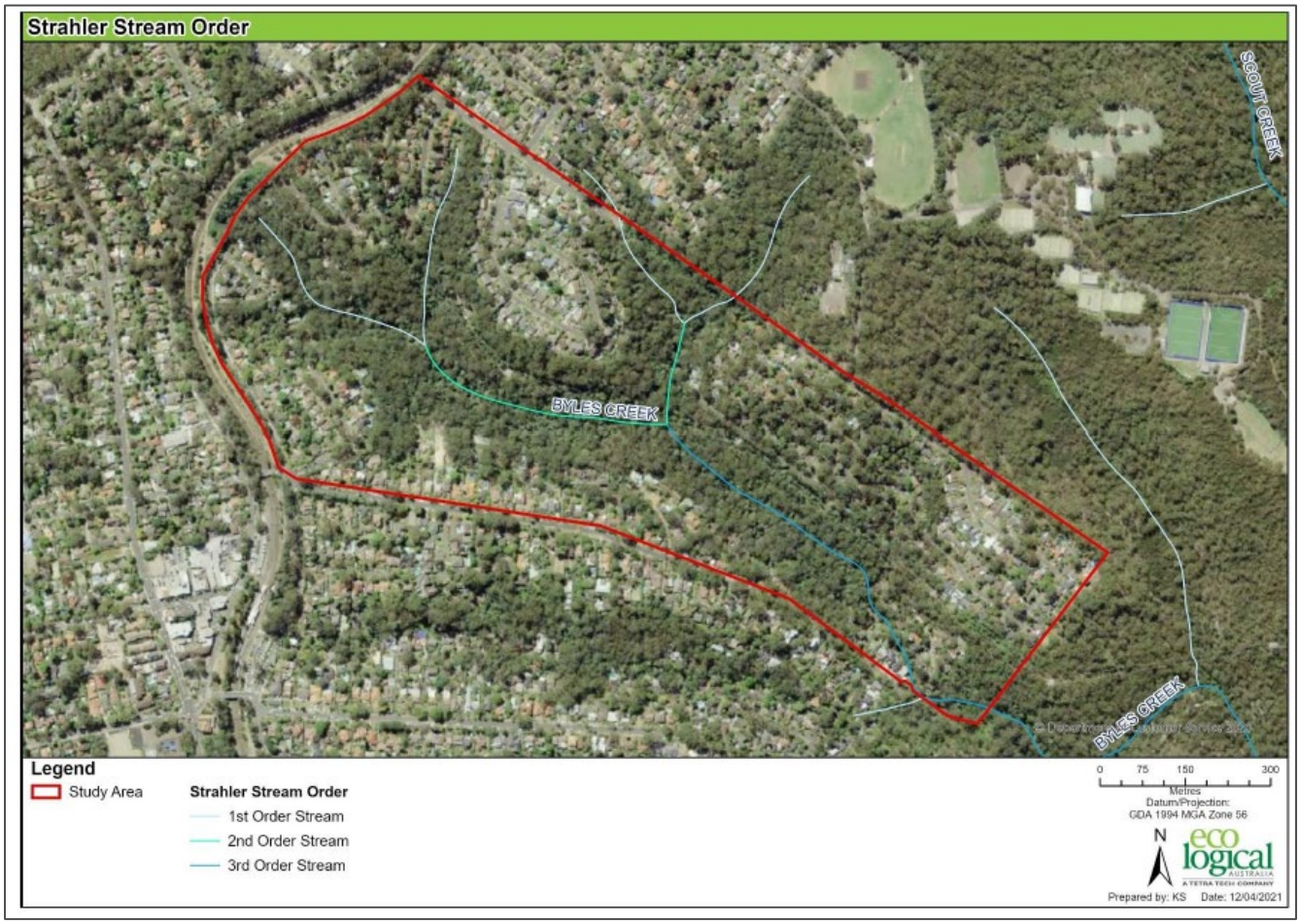
5.3 Watercourses and water quality

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

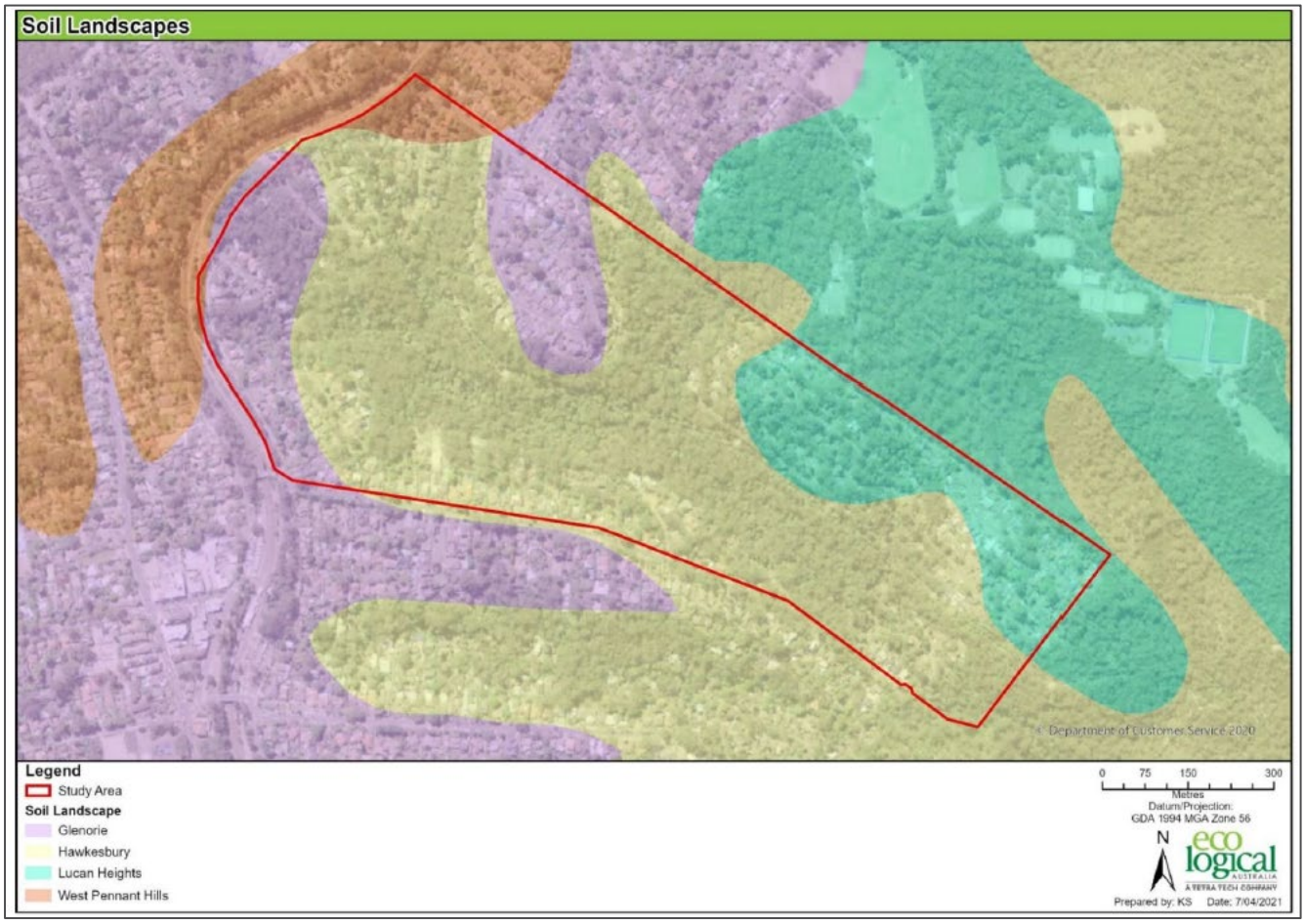


Source: Eco Logical Australia, 2021

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.*

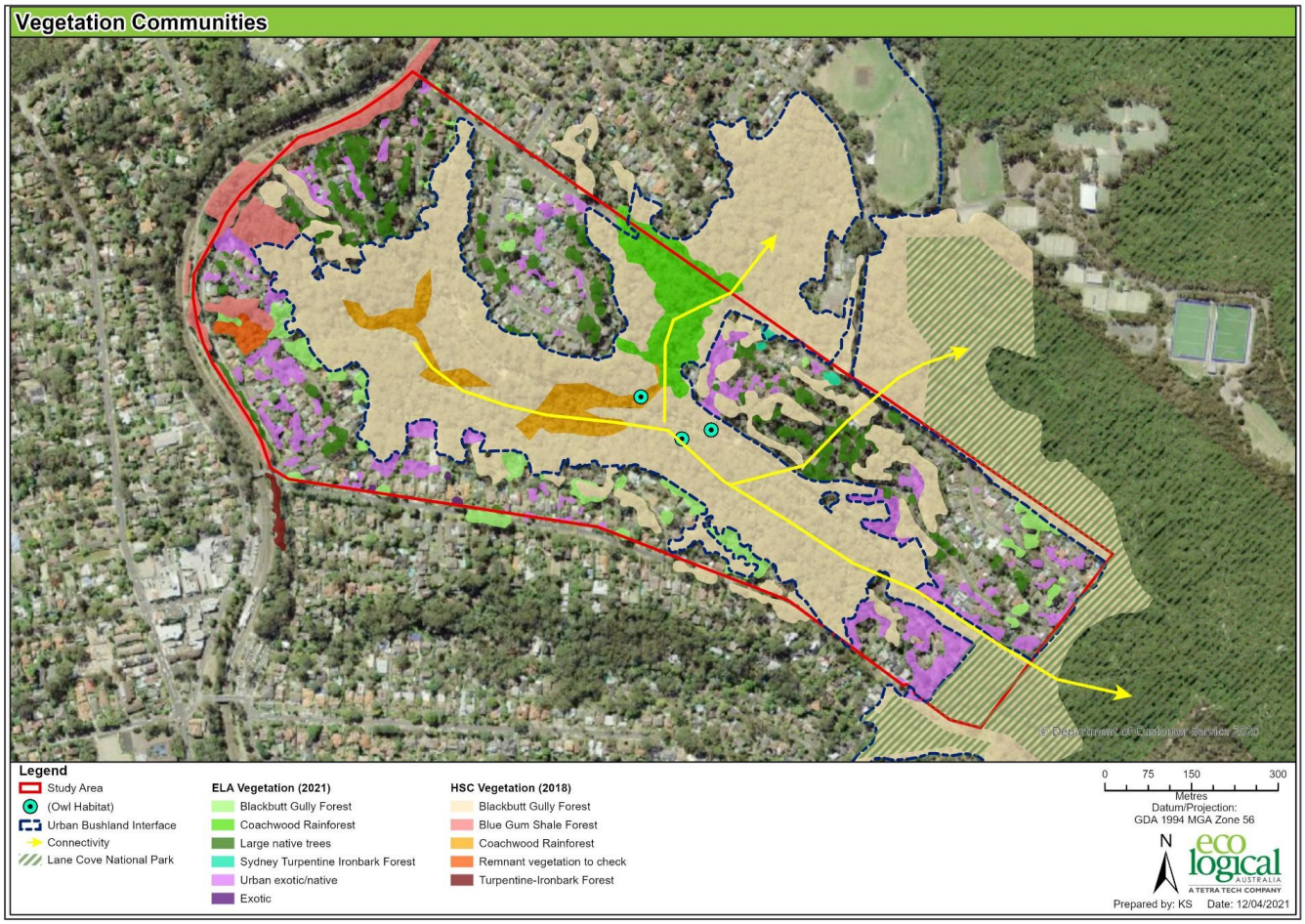
» **Coachwood Rainforest:**

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

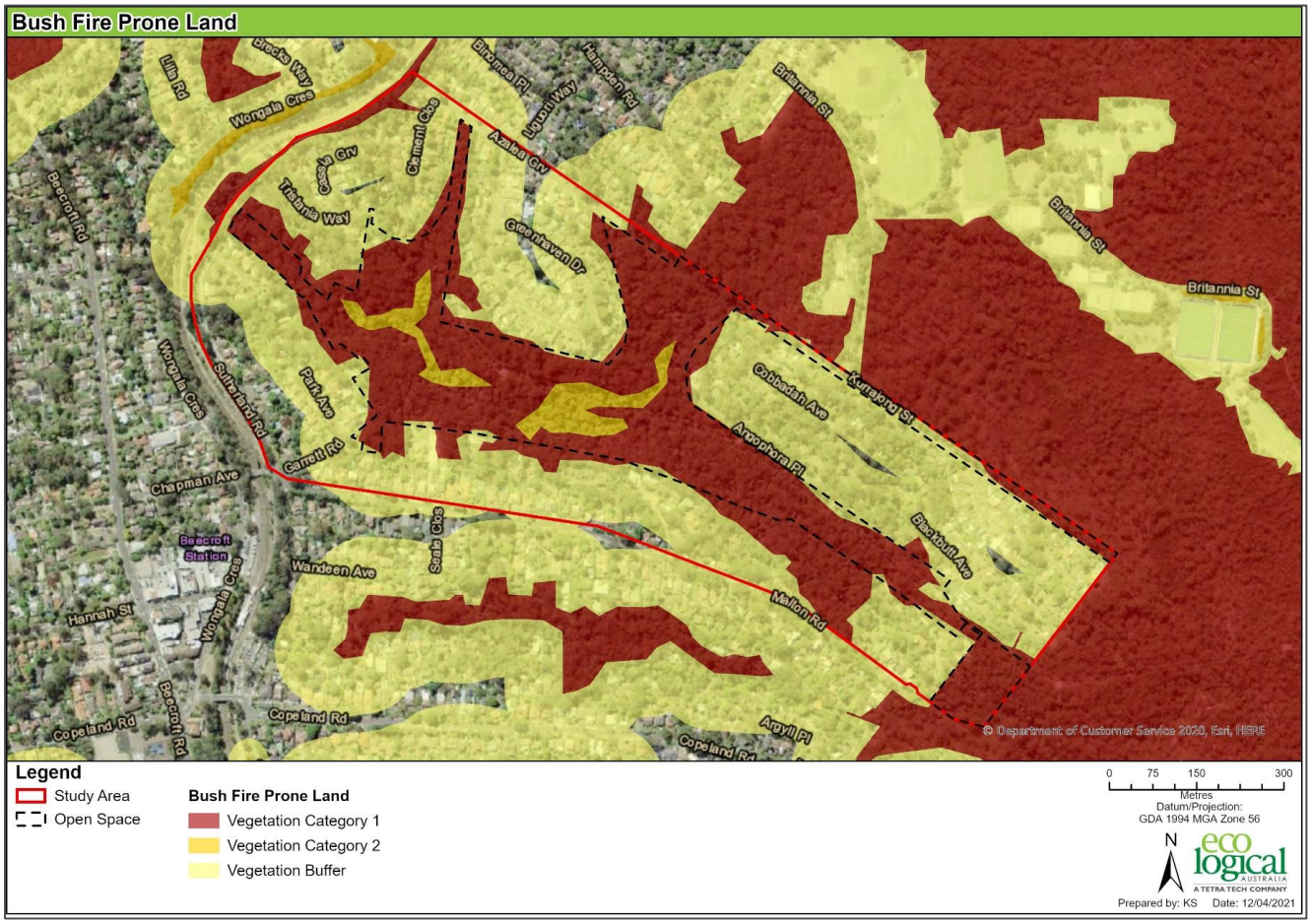
Source: Eco Logical Australia, 2021

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.

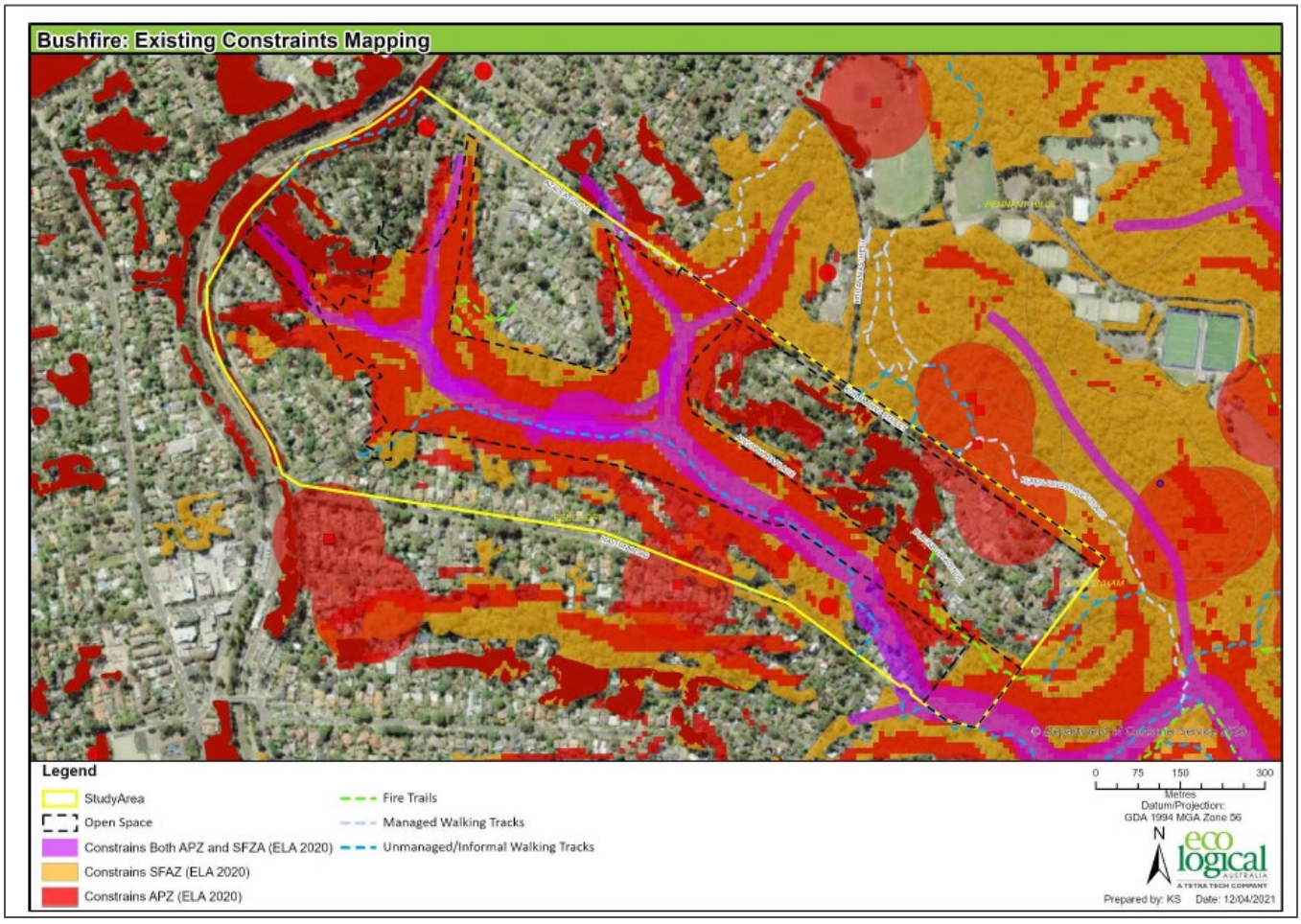
A high-level review of different development types and their ability to conform with bushfire protection requirements (within the Study Area) has been undertaken and is summarised as follows:

» 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



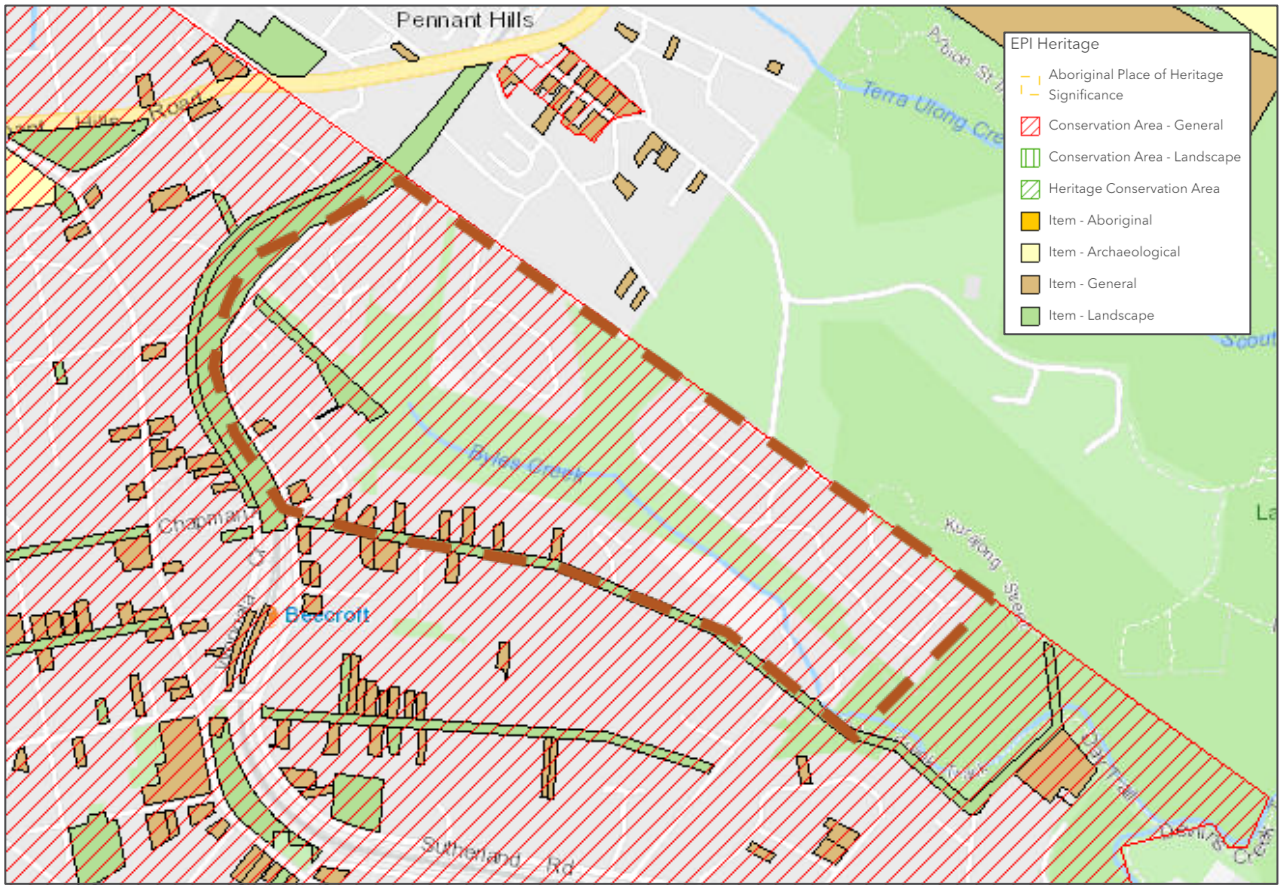
Source: Eco Logical Australia, 2021

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**).

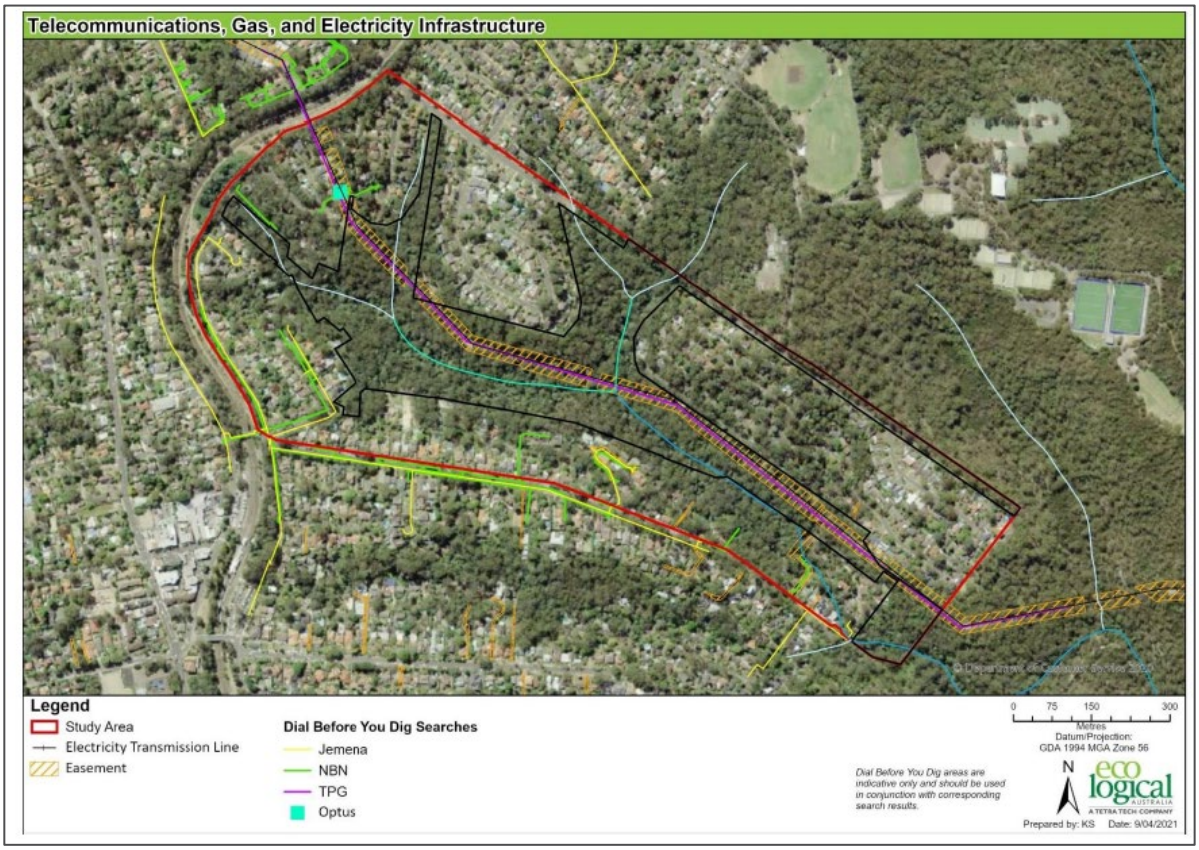
The NBN telecommunications and gas (Jemena) networks are confined to the residential areas within the study area extending mostly along the southern and western edges. The Optus search results showed one point within residential property located in the north west. The telecommunications and gas infrastructure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

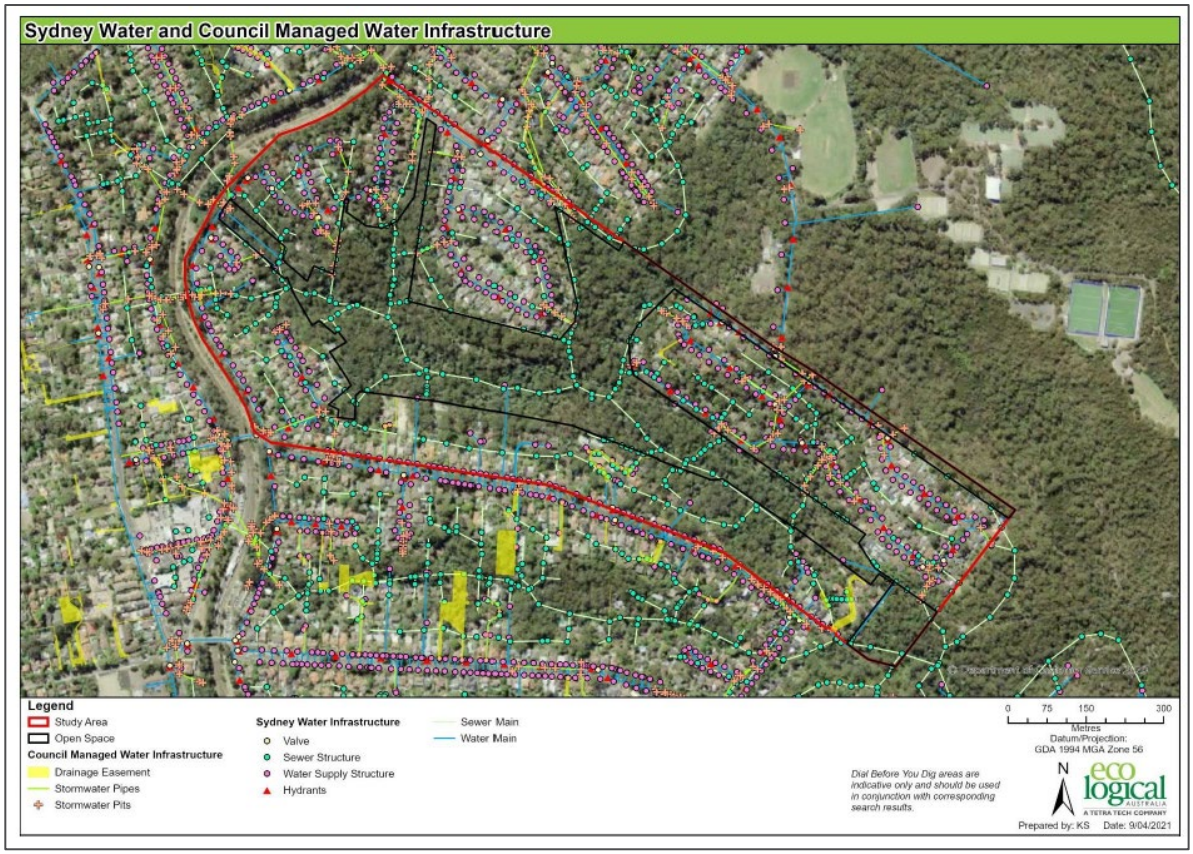
Access to TPG, electricity transmission lines/easement and water infrastructure within the Open Space area is required for maintenance and repair and will need to be maintained.

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

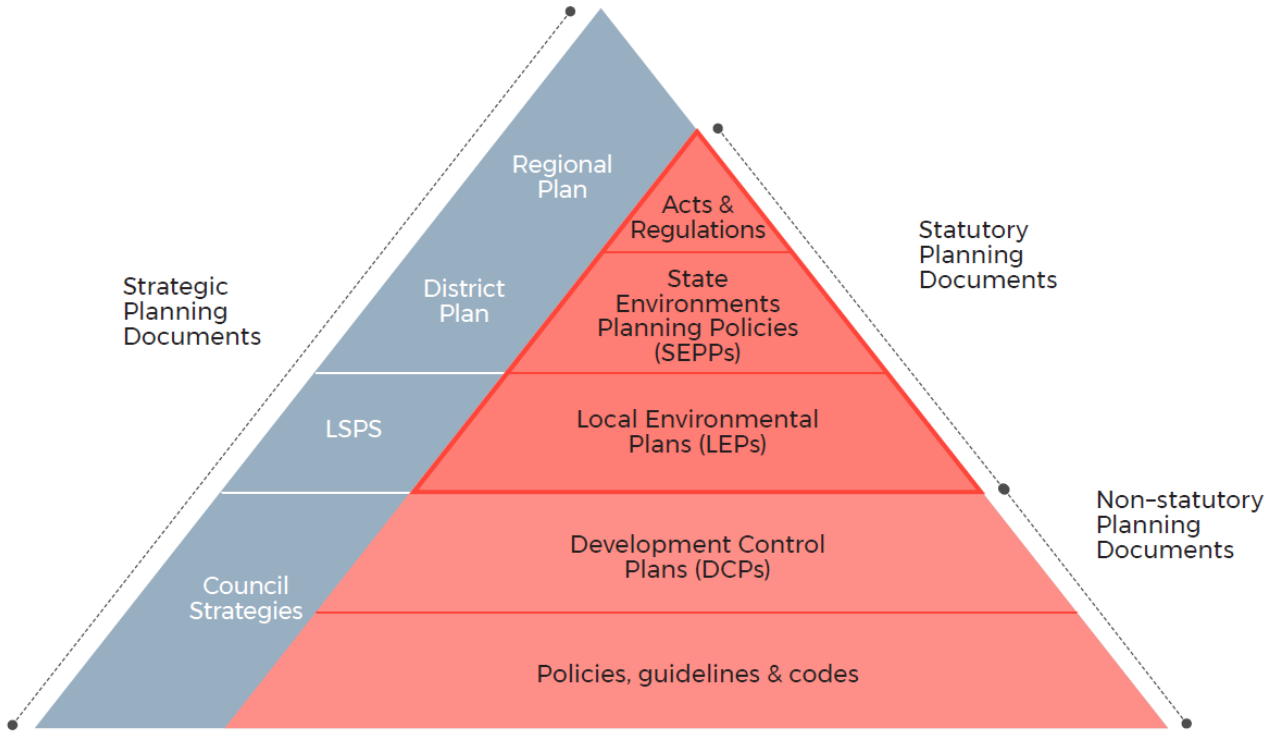
Where ecosystems have been disturbed, restoration is the preferred option to improve habitat structure and function and support biodiversity. Restoration not only includes bush regeneration and weed management in the reserve system, which is statutorily required, but also refers to urban habitat corridors 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

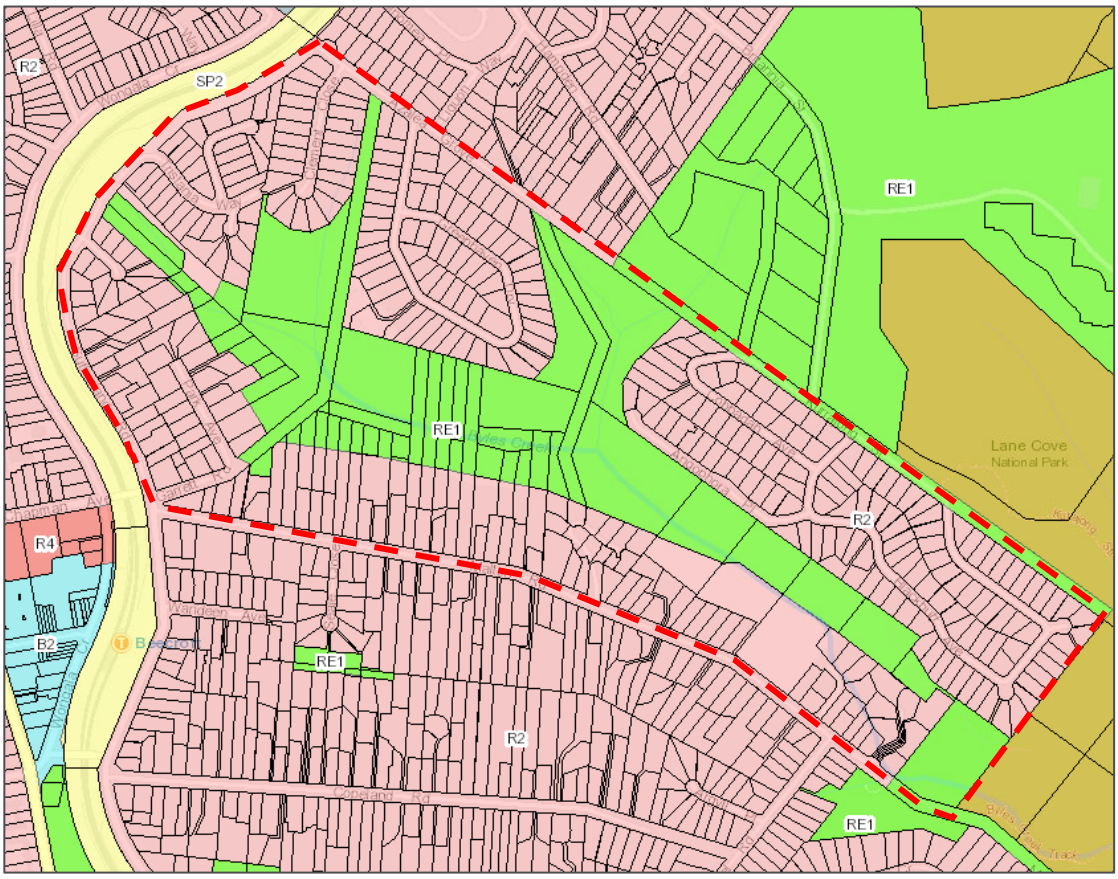
A Local Environmental Plan (LEP) is a statutory planning document that guides planning decisions for local government areas within NSW. They do this through zoning and development controls, which provide a framework for the way land can be used.

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.

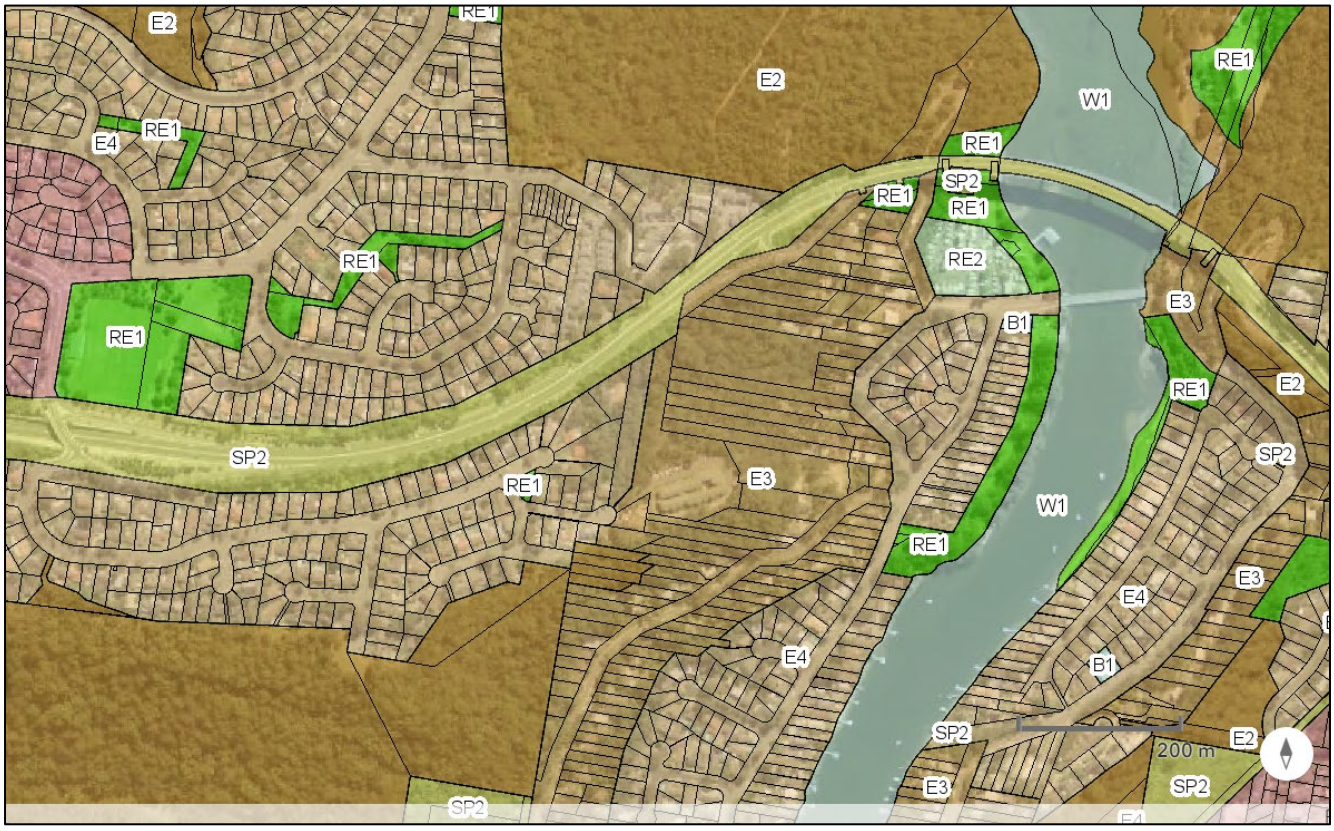
It also provides mapping for Green Web Bushland Protection areas as part of the DCP, with specific controls dependant on the hierarchy of the environmental value of the corridor (i.e. core, supporting and restoration corridors) which operates on both private and public lands (**Figure 23)**.

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.

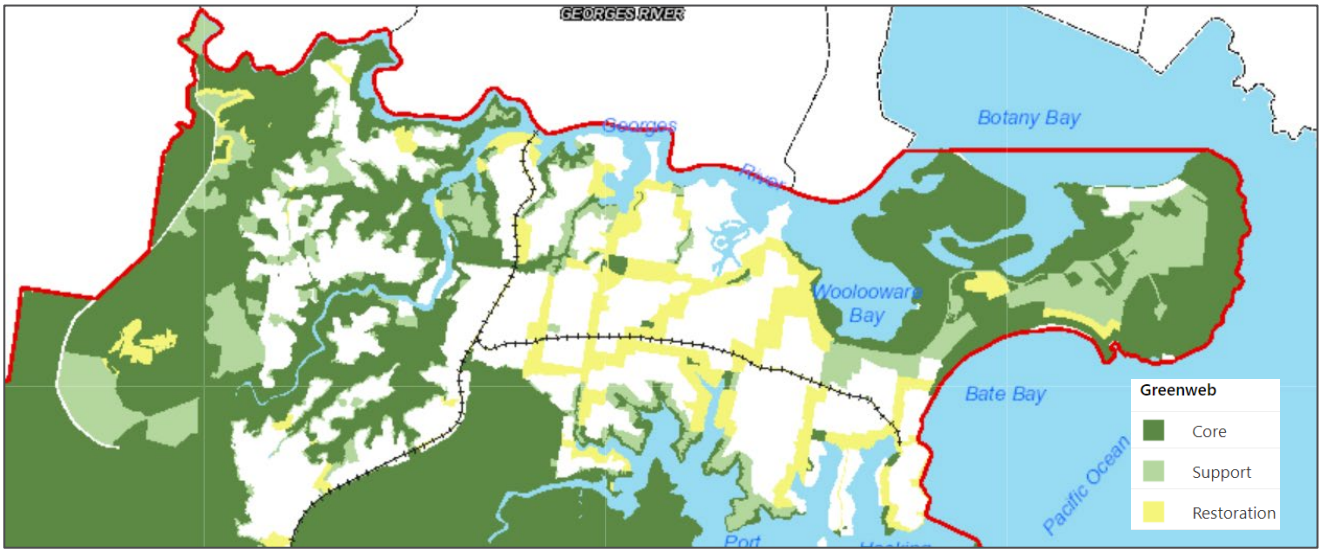
Resources provided online via Councils website include native plant selectors, information on nature wildlife and recourses for Bushcare volunteers

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.

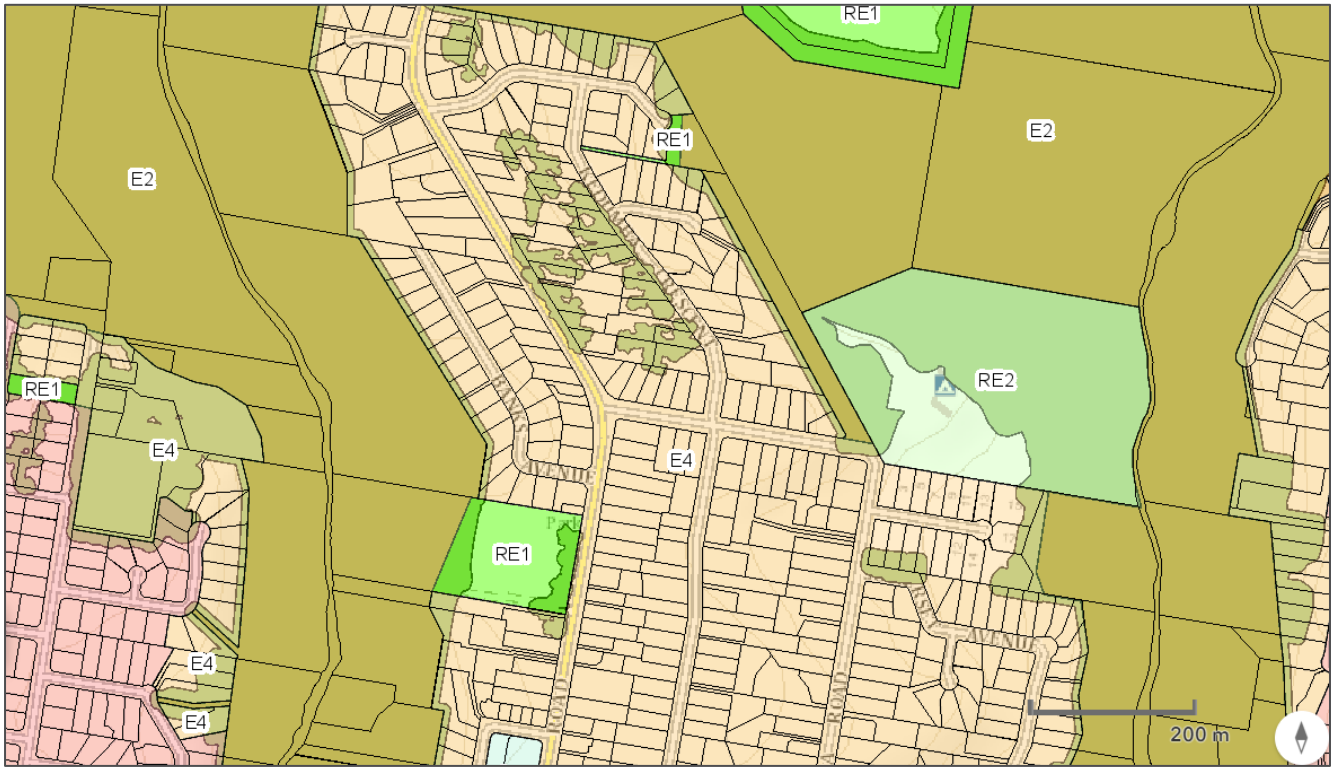
Similar to Sutherland Shire, Ku-ring-gai Council has zoned fringing residential areas within the LGA E4 - Environmental Living (**Figure 24**).

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

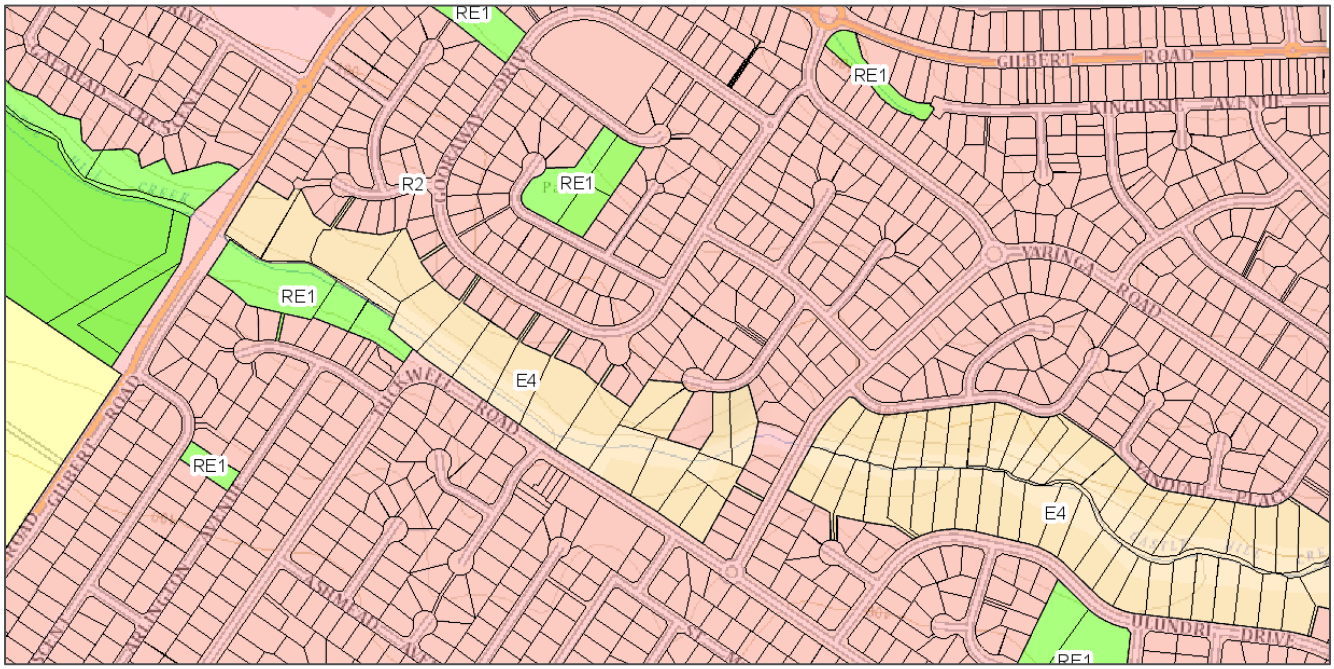


The Hills Shire

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;

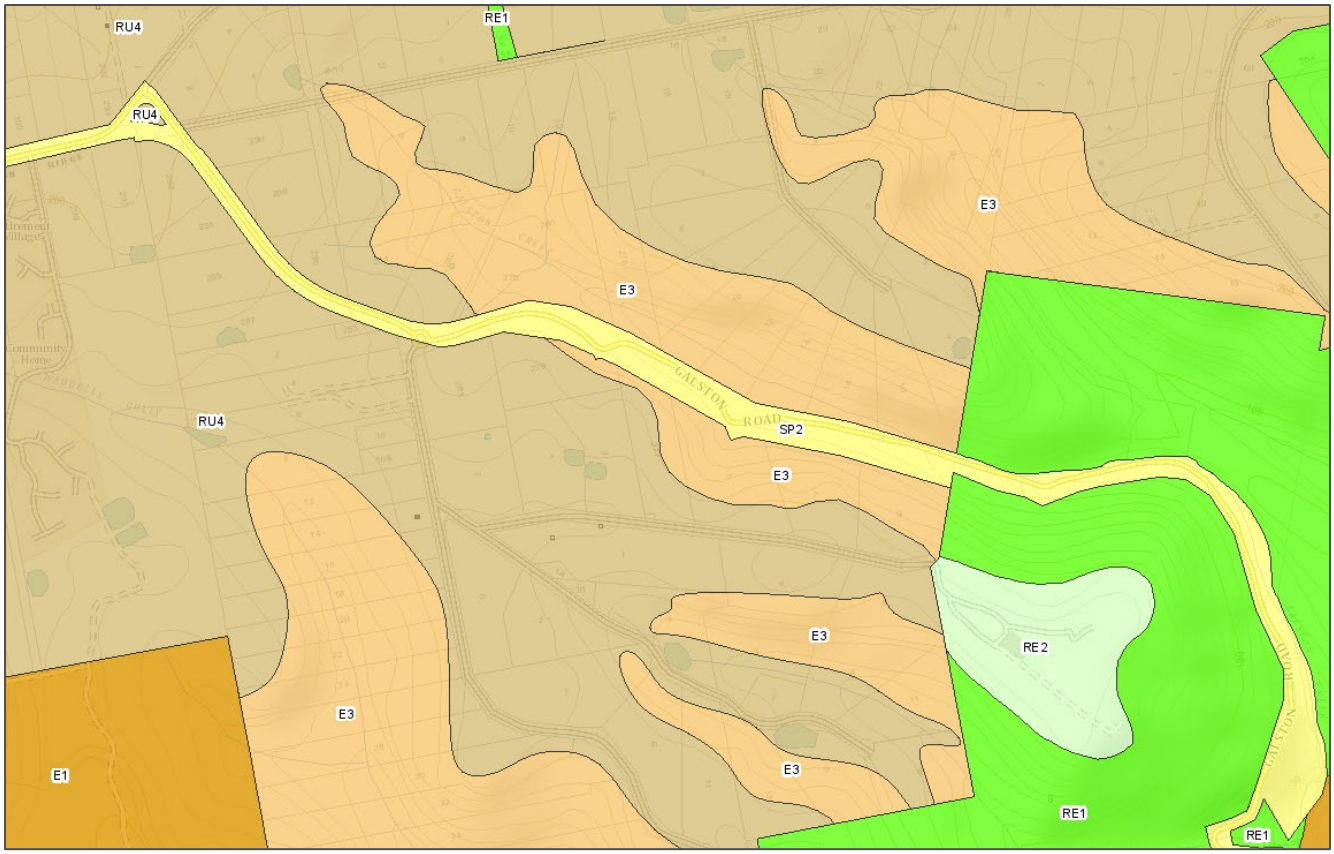
» High potential for site erosion; and,

» 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

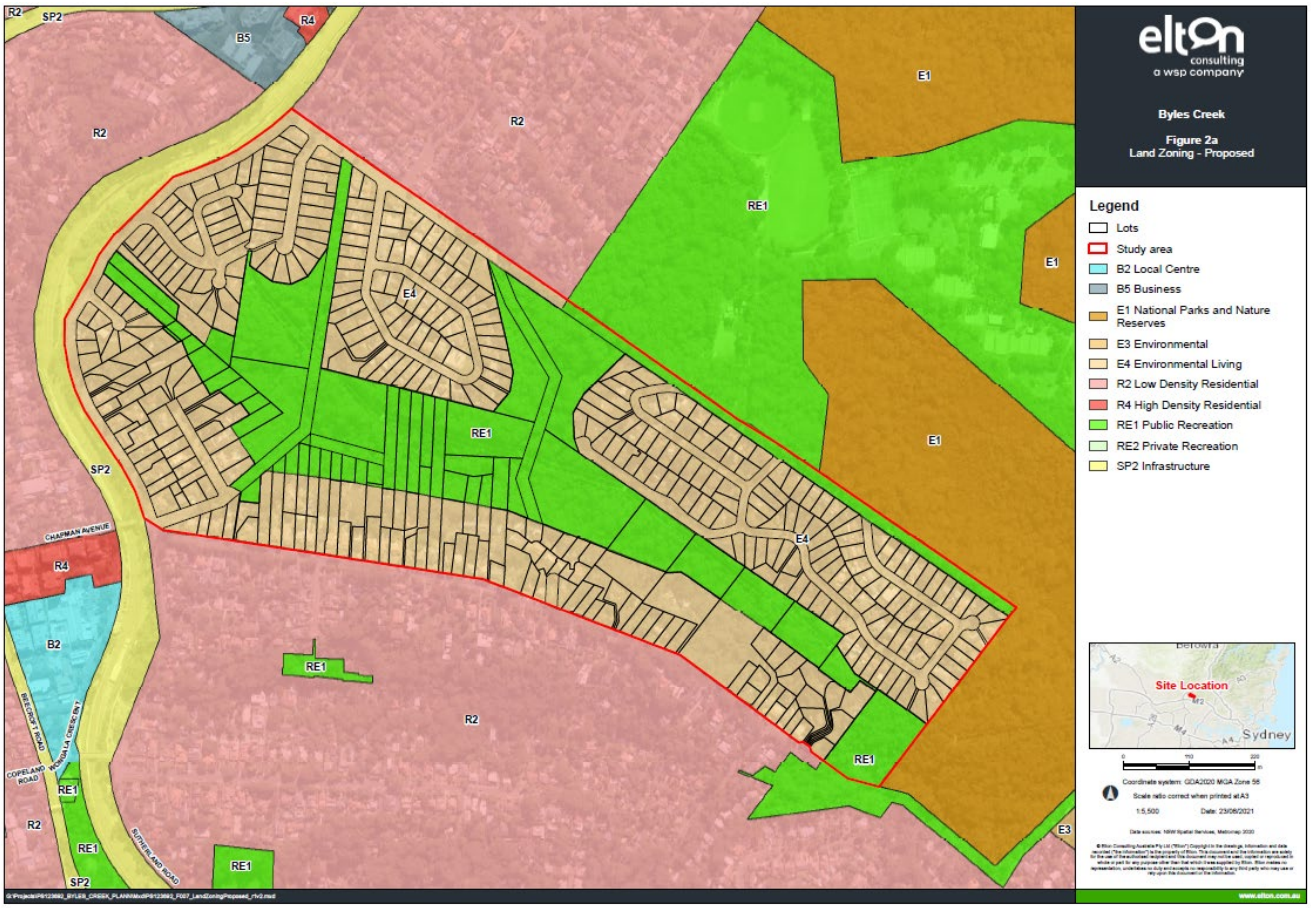
Based on findings of the background and literature review and evaluation of the opportunities (**Chapter 10**) and outcomes of the community feedback received during the consultation period, the following sub-chapters provide recommendations for Council's local planning framework, and other supporting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

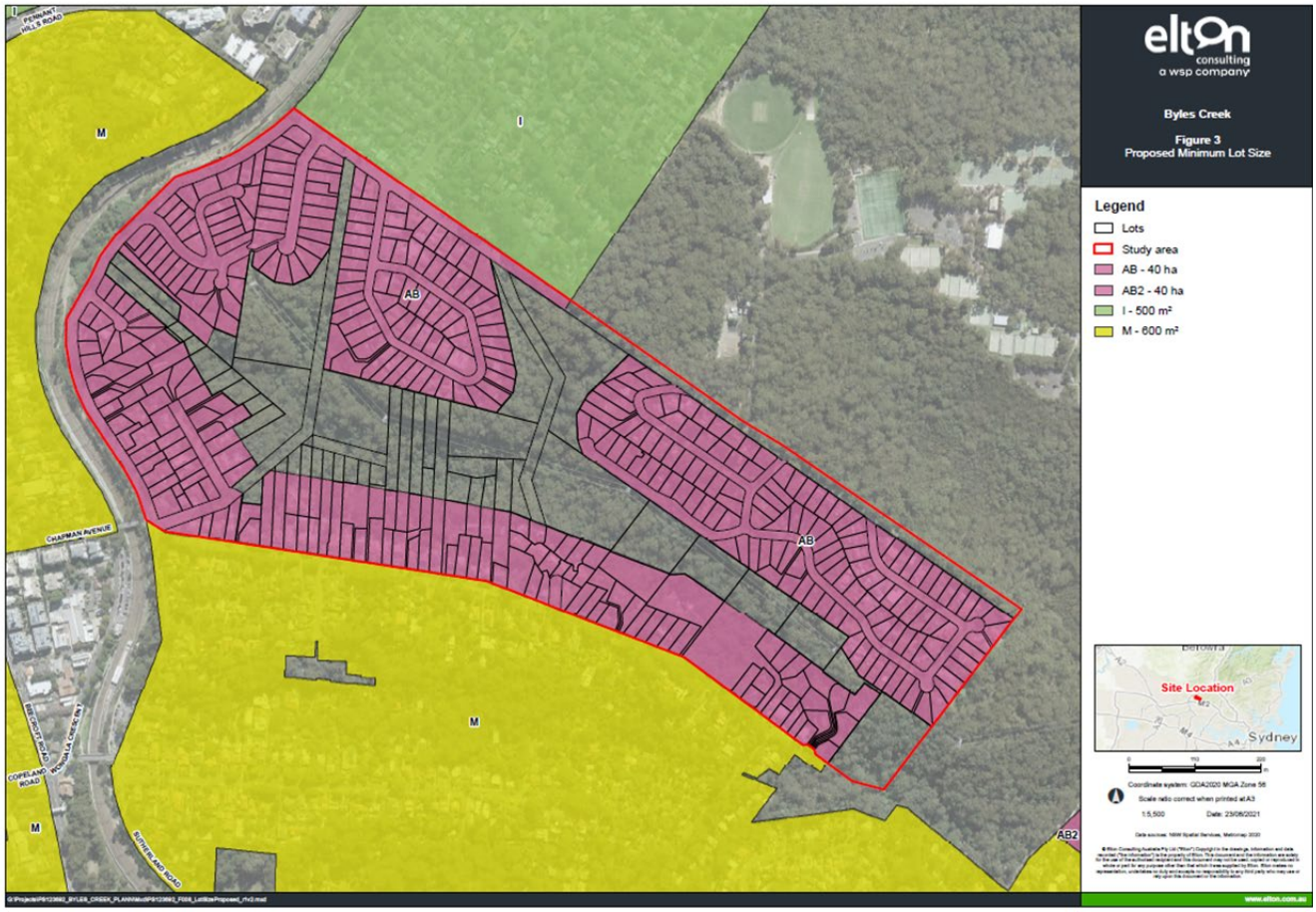
It will not trigger any additional development applications or restrictions but will identify matters to be considered in the assessment of DAs.

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

A Site Constraints & Opportunities Analysis

B Economic Implications Analysis

C Consultation Outcomes Report