

2.27 – Intermittent streams and riparian margins - section 32 evaluation for the Proposed Auckland Unitary Plan

| | | |
|----------|---|-----------|
| 1 | OVERVIEW AND PURPOSE | 2 |
| 1.1 | Subject Matter of this Section..... | 2 |
| 1.2 | Resource Management Issue to be addressed..... | 2 |
| 1.3 | Significance of this Subject | 3 |
| 1.4 | Regional Plans and Strategies | 4 |
| 1.5 | National Guidance and Direction..... | 6 |
| 1.6 | Current Objectives, Policies, Rules and Methods | 8 |
| 1.7 | Information and Analysis..... | 11 |
| 1.8 | Consultation Undertaken..... | 11 |
| 1.9 | Decision-Making..... | 12 |
| 1.10 | Proposed Provisions..... | 12 |
| 1.11 | Reference to other Evaluations | 12 |
| 2 | OBJECTIVES, POLICIES AND RULES | 12 |
| 2.1 | Objectives..... | 12 |
| 3 | ALTERNATIVES | 18 |
| 3.1 | Management of Intermittent Streams | 18 |
| 3.2 | Riparian Yards..... | 21 |
| 4 | CONCLUSION | 24 |
| 5 | RECORD OF DEVELOPMENT OF PROVISIONS | 24 |
| 5.1 | Information and Analysis | 24 |
| 5.2 | Consultation Undertaken..... | 25 |
| 5.3 | Decision-Making..... | 25 |
| 5.4 | Further References | 25 |

1 Overview and Purpose

1.1 Subject Matter of this Section

Auckland's freshwater resources include lakes, rivers, streams, wetlands and groundwater aquifers. Their values include natural character, landscape, biodiversity, amenity and recreational, navigation and access, and stock, domestic and municipal water supply. Rivers and streams and their margins in particular provide an essential link between the land and the sea, including natural processes to regulate runoff during storms, receive and filter contaminants, and allow fish to reach spawning areas and upstream habitats.

The primary framework for the management of, and undertaking works in, the beds of lakes and rivers is detailed in the Auckland Council Regional Plan: Air, Land and Water (ALW Plan). This framework differentiates between a permanent river and stream, being that part of the stream that flows year round or retains stable pools through summer, and intermittent stream reaches that are subject to periodic drying over the summer months.

The ALW Plan affords a significant level of protection to permanent rivers or streams, largely controlling activities (including structures, piping and reclamation) in, on over or under the bed of a river through resource consents. However, in contrast, the management of intermittent stream reaches is largely unregulated, with most activities being a permitted activity subject to controls relating to how works are undertaken. This has resulted in in-filling and loss of these channels as part of urban development.

This section discusses policy changes in the Proposed Auckland Unitary Plan (UP) which propose to give equivalent status to intermittent streams in the management of freshwater systems, specifically:

1. Broadening of the management of freshwater systems to include intermittent streams; and
2. Extending rural and urban Riparian Yards to include intermittent streams.

A set of Technical Publications were published by the Auckland Regional Council to characterise and measure the extent of headwater stream systems (and intermittent streams) in representative land uses and hydrogeological areas. The findings are detailed in Auckland Council Technical Publications 310 to 314 entitled 'Small headwater streams of the Auckland Region', Volumes 1 – 4. These studies, in conjunction with national and overseas research, have identified intermittent stream reaches have significant values and should be managed similarly to permanently flowing streams to ensure their values and their contribution to downstream environments are protected.

The Unitary Plan proposes a broadening of the management framework for rivers and streams to include intermittent streams. This is in keeping with the wider approach of holistically managing streams and rivers and their margins as 'Freshwater Systems' and the importance of these areas is assisting in delivering Water Sensitive Design, Mana Whenua, biodiversity and other outcomes.

1.2 Resource Management Issue to be addressed

Management of freshwater systems

As discussed in the updated policy statement in the UP, Auckland's freshwater systems are susceptible to the adverse effects of urban and rural land use and development. This has led to a loss of biodiversity, the important community, cultural and natural values that freshwater systems provide, and the capacity of streams and their margins to provide ecosystem goods and services. Research into the values of headwater streams in Auckland has concluded that they have significant biodiversity values equivalent to those of permanently flowing streams, supporting species that are additional to those found in

permanent stream reaches. They also have important functions in managing connectivity, processing nutrients and regulating hydrology to downstream areas (such as stormwater conveyance, provision of re-charge areas and flood storage). The loss of habitat that occurs when intermittent streams dry up (which may only be for a few weeks annually) is largely mitigated by the reconnection of habitats that occurs during periods of flow (Bond and Cottingham 2008).

One of the defining aspects of aquatic ecosystems is longitudinal connectivity. The condition of small intermittent headwater streams can have direct impacts on the condition of downstream receiving waters (Bernhardt et al 2003; Meyer 2003; Fisher et al 2004), with a loss of headwater streams resulting in an increase in the flashiness of flows (i.e. increases flood peaks and lower base flow) in downstream reaches following destruction of headwater streams (Dunne and Leopold 1978). Along with loss of riparian margins this also results in decreased stream stability and increased erosion. Small streams are naturally highly retentive, with the capacity to temporarily store water, nutrients and sediments (Dunne and Leopold 1978; Moore and Richardson 2003; Fisher et al 2004). This retention slows the rate of downstream transport, and thereby facilitates in-stream processing of nutrients and energy (Peterson et al 2001; Bernhardt et al. 2003), with the wetting and drying cycle increasing breakdown rates of organic matter (Bond and Cottingham 2008). Processing of terrestrial inputs such as fallen leaves in headwater streams may provide a subsequent energy source for downstream ecosystems in the form of dissolved and fine particulate organic carbon (Vannote et al 1980). As much of the invertebrate food source for native fish species comprises terrestrial insects that have fallen into streams, the riparian margins that sustain these terrestrial invertebrates is critical.

Concomitantly, urban streams perform a critical stormwater conveyance and flood mitigation function, particularly in urban areas, with permanent and intermittent streams of equivalent importance.

Loss of continuity of freshwater resources and degradation of their values is a significant issue facing Auckland. Their quality is highly variable, reflecting the different land use types in a catchment and the adverse effects of many activities including piping and infilling of headwater streams, drainage of wetlands, loss of riparian vegetation, discharges of contaminants, sediment runoff, abstraction of water, increased catchment imperviousness and trampling of stream beds by stock.

At the same time, our blue and green networks will become more valuable community and environmental resources as Auckland intensifies. Unless future development is appropriately managed, streams and their margins and headwaters will continue to be lost and degraded, further reducing their extent and values.

The Auckland Plan places significant emphasis on green growth and sustainable urban development to meet the challenges of providing for significant growth, while at the same time providing communities with safe, healthy and high quality environments to live in (i.e. a liveable city). Similarly, the Indigenous Biodiversity Strategy promotes the vision of healthy and diverse ecosystems, and integrated management leading to biodiversity gains with corresponding objectives and performance measures.

1.3 Significance of this Subject

In the Auckland Region it is estimated that there are 16,650 km of permanently flowing rivers and 4,500 km of intermittent streams (Storey and Wadhwa, 2009¹). Intermittent streams therefore comprise approximately one quarter of the functional stream network, playing an

¹ An Assessment of the Lengths of Permanent, Intermittent and Ephemeral Streams in the Auckland Region. Prepared by NIWA for Auckland Regional Council. Auckland Regional Council Technical Report 2009/028.

important role in sustaining permanent streams through regulating flows and delivering nutrients and other materials downstream. Intact functional riparian margins are required for this service.

Intermittent streams are more sensitive to hydrologic impacts than permanent streams. At the same time, intermittent streams are at most risk from development, in particular in-filling and piping. Changing the regulatory framework to provide intermittent streams with the same controls as permanent streams will mean a significant improvement in their management by providing for resource consent processes to consider their modification and loss in the context of the important functions they provide.

Therefore, the proposed provisions seek to recognise the values and contributions that can be made by intermittent streams in the management of freshwater systems. This is through assigning an equal status to that of permanent streams and rivers with respect to proposed works/activities in the beds of lakes and rivers. In the interests of integrated management and consistency, and recognising the role of riparian margins in managing freshwater values, riparian yards are also proposed adjacent to intermittent streams with equal widths as those for permanent streams. Essentially, the previous differentiation between intermittent and permanent streams has been removed.

These changes will potentially require some significant change in the way in which land is developed towards implementing a water sensitive design approach which values and protects intermittent and permanent streams to the extent practicable.

1.4 Regional Plans and Strategies

The Auckland Plan 2012

The Auckland Plan (the Plan) recognises that preserving marine and fresh water quality is fundamental to Auckland's future as these features have significant community, natural and cultural values. The Plan recognises how past development in the region has placed pressure on water resources, resulted in major hydrological changes, and progressively lowered water quality and ecological function within catchments and coastal receiving environments. However, there is now better understanding of the effects of land use development and stormwater runoff and how to manage and reduce them.

In this regard, the Plan provides Directives to protect and restore ecosystems (Directive 7.5); to establish freshwater values and aspirations with communities and make freshwater an identifying feature of Auckland (Directive 7.8); set limits for minimum water quality and for maximum water take, to support iwi, community, and water users' aspirations (Directive 7.9); and to manage land to support the values of water bodies by protecting them where they are high and reviving them where they are degraded (Directive 7.10).

Corresponding actions highlight the means to achieve the Plan's vision for Auckland as the 'World's Most Liveable City' including the outcome of a 'Green Auckland'.

The actions related to freshwater systems include:

- *Manage riparian margins for biodiversity, connectivity and ecosystem services;*
- *Protect and restore wetlands to increase benefits such as flood mitigation, nutrient filtration, habitat for indigenous biodiversity and associated ecosystem, cultural and recreational services;*
- *Facilitate and invest in riparian planting to trap sediment and nutrients: enhance riparian areas and catchment headwaters;*

- *Provide for integrated management within whole catchments, to ensure freshwater and coastal outcomes are met by coordinating and sequencing of growth, land use, development and provision of infrastructure; and*
- *Improve integrated management of freshwater, associated systems, and use of land in whole catchments.*

Holistic management of freshwater systems is required to give effect to the strategic direction provided by the Plan.

Indigenous Biodiversity Strategy 2012

The Indigenous Biodiversity Strategy (the Strategy) was developed by the Auckland Council in recognition of the previously fragmented approach to the management of biodiversity across jurisdictional boundaries. In its current form (Phase One) it sets out a range of visions, strategic objectives, performance measures and principles, with a second phase comprising on-going projects and programmes to fulfil the aspirations of the strategy, largely through the implementation of Council plans and programmes. There are a number of areas in the Strategy which are relevant to the management of freshwater systems, including:

Vision

Healthy and diverse ecosystems of plants and animals:

- *Auckland's ecosystems are functioning and healthy*
- *Priority ecosystems and species managed effectively*
- *Nature connected across Auckland in linkages and sequences*

Ecosystem services provided by indigenous biodiversity:

- *Ecosystem service values are recognised and incorporated in plans and decision making*
- *Biodiversity maintained or enhanced to ensure that future environmental changes will not reduce ecosystem services or functions*

Integrated management producing biodiversity gains:

- *Linkages and interactions between biodiversity across terrestrial, freshwater and marine ecosystems recognised and provided for in planning documents and internal and external programmes*

Objective 1:

Conserve the greatest number and most diverse range of Auckland's indigenous ecosystems and sequences

Objective 3:

Maintain and enhance the goods and services provided by our natural environment in a way that supports indigenous biodiversity

Objective 6:

Improve knowledge and understanding of biodiversity in the region in order to protect and manage it effectively

Objective 8:

Improve implementation of council statutory responsibilities to support our biodiversity Mandate

As discussed above, research has identified the important aquatic ecosystem values of intermittent streams and their contribution to wider ecosystem and biodiversity values.

1.5 National Guidance and Direction

Auckland Council is required to give effect to any National Policy Statement through its RMA plans. Of particular relevance to freshwater systems are:

- National Policy Statement for Freshwater Management, 2011 (NPSFM)
- New Zealand Coastal Policy Statement, 2010 (NZCPS)
- Hauraki Gulf Marine Park Act 2000 (HGMPA) - Sections 7 and 8 have the status of a national policy statement.

National Policy Statement for Freshwater Management 2011

The National Policy Statement for Freshwater Management (NPSFM) seeks to maintain or improve the overall quality of freshwater resources and maintain the life supporting capacity of freshwater resources. The primary mechanism of achieving this is by requiring regional councils to set objectives for freshwater bodies that reflect national and local aspirations and to set water quality and quantity limits to ensure those objectives are achieved. Importantly, the NPSFM also requires the integrated management of land use and development and fresh water and involve iwi and hapu in decision making.

The provisions in the NPSFM of particular relevance to the management of freshwater systems are:

Objective A1

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of fresh water within a region is maintained or improved while:

- protecting the quality of outstanding freshwater bodies;*
- protecting the significant values of wetlands and*
- improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.*

Policy A1

By every regional council making or changing regional plans to the extent needed to ensure the plans:

- establish freshwater objectives and set freshwater quality limits for all bodies of fresh water in their regions to give effect to the objectives in this national policy statement, having regard to at least the following:*
 - the reasonably foreseeable impacts of climate change*
 - the connection between water bodies;*
- establish methods (including rules) to avoid over-allocation.*

Objective C1

To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.

Policy C1

By every regional council managing fresh water and land use and development in catchments in an integrated and sustainable way, so as to avoid, remedy or mitigate adverse effects, including cumulative effects.

Policy C2

By every regional council making or changing regional policy statements to the extent needed to provide for the integrated management of the effects of the use and development of land on fresh water, including encouraging the co-ordination and sequencing of regional and/or urban growth, land use and development and the provision of infrastructure.

The management of entire freshwater systems is important in achieving these objectives and is consistent with the integrated management outcomes of the NPSFM and the maintaining or improving freshwater quality

New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement 2010 (NZCPS) also provides Auckland Council with direction for managing the effects of land use and discharges on the coastal environment. This includes a number of specific objectives and policies relevant to the management of freshwater resources, including:

Objective 1

To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by: ...maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity.

To achieve this and other objectives, the NZCPS establishes a range of policies of which the most relevant are:

Policy 21 Enhancement of water quality

Where the quality of water in the coastal environment has deteriorated so that it is having a significant adverse effect on ecosystems, natural habitats, or water based recreational activities, or is restricting existing uses, such as aquaculture, shellfish gathering, and cultural activities, give priority to improving that quality by:

- (a) identifying such areas of coastal water and water bodies and including them in plans;*
- (b) including provisions in plans to address improving water quality in the areas identified above;*
- (c) where practicable, restoring water quality to at least a state that can support such activities and ecosystems and natural habitats; ...*
- (d)*

Policy 22 Sedimentation

- (1) Assess and monitor sedimentation levels and impacts on the coastal environment.*
- (2) Require that subdivision, use, or development will not result in a significant increase in sedimentation in the coastal marine area, or other coastal water.*
- (4) Reduce sediment loadings in runoff and in stormwater systems through controls on land use activities.*

In summary, the NZCPS seeks to maintain or improve coastal water quality where it is having significant adverse effects on ecosystems and habitats or on existing uses. The NZCPS specifically identifies a range of mechanisms to manage discharges into freshwater and sedimentation, including reducing contaminant loads and stormwater flows at source through design and controls on land use activities. In addition, the NZCPS requires councils to provide for the integrated management of natural and physical resources and the management of land use activities.

Intermittent streams and their associated riparian margins play an important role in regulating flows and contaminants to downstream environments.

Hauraki Gulf Marine Park Act 2000

A large number of Auckland's urban areas drain to the Hauraki Gulf Marine Park and hence are subject to the provisions of the Hauraki Gulf Marine Park Act 2000 (HGMPA). The purpose of the HGMPA is to establish objectives and integrate the management of the resources of the Hauraki Gulf and its contributing catchments. Sections 7 and 8 of the HGMPA have the status of a national policy statement.

7 Recognition of national significance of Hauraki Gulf

- (1) *The interrelationship between the Hauraki Gulf, its islands, and catchments and the ability of that interrelationship to sustain the life-supporting capacity of the environment of the Hauraki Gulf and its islands are matters of national significance.*
- (2) *The life-supporting capacity of the environment of the Gulf and its islands includes the capacity—*
 - (a) *to provide for—*
 - (i) *the historic, traditional, cultural, and spiritual relationship of the tangata whenua of the Gulf with the Gulf and its islands; and*
 - (ii) *the social, economic, recreational, and cultural well-being of people and communities:*
 - (b) *to use the resources of the Gulf by the people and communities of the Gulf and New Zealand for economic activities and recreation:*
 - (c) *to maintain the soil, air, water, and ecosystems of the Gulf.*

8 Management of Hauraki Gulf

To recognise the national significance of the Hauraki Gulf, its islands, and catchments, the objectives of the management of the Hauraki Gulf, its islands, and catchments are—

- (a) *the protection and, where appropriate, the enhancement of the life-supporting capacity of the environment of the Hauraki Gulf, its islands, and catchments:*
- (b) *the protection and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments:*
- (c) *the protection and, where appropriate, the enhancement of those natural, historic, and physical resources (including kaimoana) of the Hauraki Gulf, its islands, and catchments with which tangata whenua have an historic, traditional, cultural, and spiritual relationship:*
- (d) *the protection of the cultural and historic associations of people and communities in and around the Hauraki Gulf with its natural, historic, and physical resources:*
- (e) *the maintenance and, where appropriate, the enhancement of the contribution of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments to the social and economic well-being of the people and communities of the Hauraki Gulf and New Zealand:*
- (f) *the maintenance and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments, which contribute to the recreation and enjoyment of the Hauraki Gulf for the people and communities of the Hauraki Gulf and New Zealand.*

As previously indicated, the contribution of intermittent stream reaches to freshwater biodiversity has historically been underestimated, which has led to their loss and degradation with associated downstream quality and ecosystem effects.

1.6 Current Objectives, Policies, Rules and Methods Auckland Council Regional Plan: Air, Land and Water

The RMA defines a 'river' as:

“a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an

irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal)”

This very broad definition of a river includes all stages of a river – from overland flow through to flow in a defined river channel.

The ALW Plan uses the term ‘rivers and streams’. The majority of watercourses in the Auckland region are smaller watercourses commonly referred to as streams, rather than rivers. There are few larger watercourses, for example the Hotoe, Kaipara and Wairoa, that are typically known as rivers. Calling smaller watercourses rivers is contrary to common usage and could be misleading for the public, so in the ALW Plan it was resolved to include rivers and streams in the definition.

In the ALW Plan, streams are sub-divided and managed as one of two types: ‘permanent’ or ‘intermittent’, depending on the permanence of their hydrology. Permanent rivers or streams are distinguished from intermittent streams by the presence of year-round continual flows or standing water. They provide habitat for fish and other aquatic life, and pathways for the migratory lifecycle of native fish. Permanent rivers or streams also assist in flushing and assimilating contaminants. Intermittent streams are defined as any stream that is not a permanent stream.

The ALW Plan definition of ‘intermittent’ combines two hydrological stream types, intermittent and ephemeral. The flow of intermittent streams is by definition not always continuous, as they cease to flow for some periods over the course of a year and do not have standing water above a level specified in the ALW Plan. Ephemeral streams do not have a defined bed or banks and only flow for brief periods during or following rainfall.

There are several limitations with the ALW Plan definition of a permanent river and stream. The determination between permanent and intermittent is based on a calculation of area and depth of pools over a given reach. It is difficult to use this approach to gain a consistent classification. In addition, note 3 of the definition in the ALW Plan:

- allows assessment for determining stream type to occur at any time of the year
- allows reassessment of stream reaches identified as permanent
- does not allow reassessment of reaches defined intermittent

In practice, this means that the setting of the boundary between permanent and intermittent can be undertaken at any time of the year. Flow characteristics of river reaches can vary greatly over the course of the year, depending on factors including rainfall and temperature. As a result, the boundary can change depending on the time of year the assessment is undertaken. This means that streams which are categorised as permanent and subject to consenting requirements can be reclassified to intermittent during drought periods and come under permissive provisions. Additionally, reassessment of reaches from permanent to intermittent is possible, while intermittent to permanent is not.

The ALW Plan definitions of river types and provisions relating to them were drafted when there was little evidence of the value or function of intermittent streams. However, the ALW Plan recognised that its understanding of these stream reaches was limited and stated:

“Intermittent streams are important for the maintenance of water quality and quantity. The ARC has completed initial scientific investigations on the values of Intermittent streams and their contribution to the hydrology and aquatic ecosystems of the wider catchment. However a comprehensive policy response to the findings and their implications for the management of activities in the beds of Intermittent streams both

inside and outside *Urban Areas* is yet to be developed. Any further rules controlling activities in the beds of *Intermittent streams* will be introduced by a change to the Plan.

In the meantime, the provisions of this chapter permit activities such as structures and disturbance including the disturbance of exotic and indigenous vegetation and plant and animal habitats, the introduction or planting of plants, deposition and reclamation within *Intermittent streams*, subject to controls on how the work is undertaken to address sedimentation and flooding effects.”

The objectives and policies in the ALW Plan around maintenance and enhancement of freshwater and avoidance, remediation or mitigation of effects refer to permanent rivers and streams, and do not include intermittent. In the rules, activities in intermittent streams are permitted subject to minimal controls around adverse effects from flooding, erosion and sedimentation. If these conditions are unable to be met, the activity becomes a controlled activity (Rules 7.5.1, 7.5.7, 7.5.14, 7.5.17, 7.5.25, 7.5.29, 7.5.30 and 7.5.35). These controls are much less stringent requirements than for permanent streams.

As a result of the permissive regulatory framework adopted, intermittent streams in the Auckland Region are being piped or reclaimed without the requirement for any assessment of their value or wider contribution.

Since the notification of the ALW Plan, scientific research has found that intermittent streams are valuable habitats containing a diverse range of fauna and deserve protection. The planning framework needs to be updated to improve the way intermittent streams are managed.

District Plans

The Waitakere District Plan and North Shore District Plans provided more advanced intermittent stream and riparian margin management approaches than other legacy Plans in the region. The Waitakere District Plan includes variable riparian buffers based on extensive stream surveys. In 1995 the Council surveyed the condition of riparian margins in the City. This survey collected information such as the stability of stream banks, vegetation types and a visual assessment of pollution. The survey covered all lakes, wetlands and streams (greater than half of one metre in width) where those stream banks were not covered in native vegetation.

Based on these surveys, the District Plan applies various riparian margin widths to the surveyed stream banks. Depending on their physical characteristics, riparian margins vary in width from five to twenty metres. The margin is measured from the waters edge at times of normal flow, over the contours of the land, and applies to both sides of the waterway. The width depends upon the qualities of the waterway, the potential flooding risks and the environment surrounding the stream. Intermittent streams are mapped, and have a zero yard applying.

The Operative District Plan Rules aim to retain the riparian margins as a natural landscape feature. Therefore the Rules limit vegetation alteration, earthworks, impermeable surfaces, stock grazing and buildings including bridges in the riparian margins.

More detail can be found in the Waitakere Operative District Plan.

North Shore District Plan protects streams and riparian margins through restricting development within the first 5m of the riparian margin and enabling development up to 10% of the riparian margin within the 5-10m zone provided enhancement and restoration is provided.

A riparian margin of 20m is in the rural and urban expansion zones 10m for other zones. Riparian margins provisions apply to permanent and intermittent streams. In the case of intermittent streams, the distance is measured from the stream centre line.

More detail can be found in the objectives and policies relating to Section 8 (Stormwater Catchment Management) and Section 9 (Subdivision and Development) of the legacy North Shore City District Plan.

1.7 Information and Analysis

A set of Technical Publications were published by the Auckland Regional Council to characterise and measure the extent of headwater stream systems (and intermittent streams) in representative land uses and hydrogeological areas. The findings are detailed in the Auckland Council Technical Publications 310 to 314 entitled 'Small headwater streams of the Auckland Region', Volumes 1 – 4. Relevant conclusions from these technical publications include:

- Isolated pools were found to be the most abundant habitat type in headwater streams and therefore represent an important habitat in the Auckland region.
- Aquatic invertebrates were found in all habitats of the headwater streams, including mud.
- Taxon richness, and Ephemeroptera, Plecoptera and Trichoptera (EPT) taxon richness were generally similar across each of the water habitat types (perennial, flowing, isolated pools).
- EPT taxa were present in mud in native forest and riparian-protected pasture streams.
- Additional taxa were found in the temporary headwater habitats that were not present in the perennial stream. This suggests that these areas contain specialist species that do not occur commonly in perennial streams.
- Small headwater streams should be given the same status as small perennial streams regarding management for the protection of natural values.
- To restore or protect biodiversity in headwater streams, riparian protection is recommended.

The importance of intermittent streams in the stream continuum is well documented internationally (Bond and Cottingham 2008; McDonough et al 2011; Levick et al 2008). Importantly, intermittent streams and their riparian margins play a critical role in sustaining and maintaining permanent streams in good health.

1.8 Consultation Undertaken

The following consultation has been undertaken with respect to the proposed management of intermittent streams and riparian yards:

- There have been ongoing internal discussions with the Stormwater Unit, Freshwater Policy, the Research, Investigations and Monitoring Unit, Natural Resources Specialist Input Consenting team and the Environmental Services Biodiversity team with regard to the management of intermittent streams.
- The proposal was presented at the Mana Whenua hui, North and South in March and October 2012.
- Presented at stakeholder and sector workshops – conservation and environmental organisations and Rural Advisory Panel.
- Presented at the External Oversight Group in October 2012.

Further information on timing of these meetings is in the general reporting on consultation and engagement undertaken on the Unitary Plan as a whole.

1.9 Decision-Making

The Political Working Party for the Unitary Plan supported the proposal to manage intermittent streams following officer discussions with external parties.

1.10 Proposed Provisions

The key changes result from the removal of the differentiation between permanent and intermittent streams following scientific studies on the values and functions of intermittent reaches. The consequences of this are:

- The application of rules for rivers and streams now also applying to intermittent reaches, which were previously uncontrolled under the ALW Plan;
- The extension of riparian yards to include intermittent reaches, consistent with the wider management approach extending protection to intermittent streams.

The implications of these changes are discussed in Section 2 below.

1.11 Reference to other Evaluations

This section 32 report should be read in conjunction with the following evaluations:

- 2.1 Urban form and land supply
- 2.3 Residential zones
- 2.4 Business
- 2.8 Sustainable design
- 2.9 Accessory parking
- 2.11 Biodiversity
- 2.17 Māori land
- 2.18 Māori and natural resources
- 2.19 Landscapes
- 2.22 Future Urban zone
- 2.24 Urban stormwater
- 2.25 Freshwater
- 2.26 Flooding
- 2.28 Natural hazards
- 2.29 Stock access
- 2.31 Earthworks
- 2.35 Rural subdivision
- 2.36 Reserve management plans
- 2.37 Schools

2 Objectives, Policies and Rules

2.1 Objectives

Objectives relevant to the management of intermittent streams and their riparian margins are found in several sections of the Unitary Plan:

Chapter B: Regional Policy Statement – 6.3 Freshwater and Geothermal Water

1. *The natural, social, economic and cultural values of freshwater and geothermal water resources are safeguarded when land, freshwater and geothermal water is used and developed.*

2. *The quality of freshwater and the natural and cultural values of freshwater systems are maintained and restored and enhanced where they have been degraded below levels necessary to safeguard life supporting capacity and meet community values.*

Chapter B: Regional Policy Statement – 4.3.4 Natural Heritage: Biodiversity

1. *Areas of significant indigenous biodiversity in terrestrial, freshwater, and coastal environments are protected from the adverse effects of subdivision use and development*
2. *Indigenous biodiversity is maintained through protection and restoration in areas where ecological values are degraded, or where development is occurring*

Chapter C: Auckland-wide objectives and policies – 5.14 Lakes, rivers, streams and wetland management

1. *Auckland's lakes, rivers, streams and wetlands with high natural values are protected from degradation and permanent loss.*
2. *Auckland's lakes, rivers, streams and wetlands are restored, maintained and enhanced.*
3. *Adverse effects on lakes, rivers, streams or wetlands that cannot be avoided, remedied or mitigated are offset in exceptional circumstances, where this will better promote the purpose of the RMA.*
4. *Structures in, on, under or over the bed of a lake, river, stream and wetland occur where there is a need for the structure to be in that location as opposed to on the land or it is necessary to provide access across a river or stream.*
5. *Activities in, on, under or over the bed of a lake, river, stream and wetland are managed to minimise adverse effects on the lake, river, stream or wetland.*
6. *Reclamation and drainage of the bed of a lake, river, stream and wetland is avoided.*

These objectives provide a foundation for managing the values of freshwater resources and the potential adverse effects of land use and development. With significant emphasis on protecting rivers and streams from further loss and degradation and enhancing rivers and streams where they are degraded.

Given the values and functions of intermittent streams, and to acknowledge their contribution to the functioning of the stream system and wider environment, the Unitary Plan seeks to provide a higher level of control to activities in intermittent streams to enhance connectivity, maintain water quality and ensure their contribution to river values and ecosystem health,

The objectives give effect to Part 2 of the RMA by providing for the sustainable management of freshwater resources (s. 5(a) RMA) and by recognising and providing for the preservation of the natural character of wetlands and lakes and rivers from inappropriate subdivision, use and development (s. 6(a) RMA). They also give effect to Objectives A1, B1, C1 and D1 of the NPSFM.

The objectives are also consistent with moving towards the Auckland Plan outcome of a “green Auckland”.

2.1.1 Policies

RPS Policy

Chapter B: Regional Policy Statement – 6.3 Freshwater and Geothermal Water Freshwater Systems

2. Manage land use, development and subdivision to:

- a) avoid the permanent loss of lakes, rivers, streams and wetlands and their margins, particularly through the piping and infilling of streams and their headwaters
- b) minimise the erosion and modification of stream beds and banks
- c) protect and enhance the supporting elements and natural, social and cultural values of remaining rivers and streams including their headwaters, riparian margins and vegetation, flood plains and wetland areas
- d) retain and enhance the connectivity between land, natural freshwater systems and the coast
- e) avoid the permanent diversion of rivers and streams unless necessary for public health and safety or significant infrastructure and other alternatives are not practicable
- f) manage stormwater flows to minimise adverse effects on stream channels and the natural, social and cultural values of natural freshwater systems
- g) maintain and enhance as far as practicable, navigation along rivers and public access to and along rivers
- h) maintain and enhance existing riparian vegetation located on the margins of streams in natural stream management areas.
- i) use opportunities provided by land use change, development and redevelopment to restore and enhance natural, social and cultural freshwater values where practicable.

Chapter B: Regional Policy Statement – 6.7 Natural Hazards Management approaches

5. Protect, as a priority, maintain and where appropriate enhance natural defence systems, such as retention of flood plains, sand dunes and vegetation and riparian margins in their natural state, as opposed to using hard engineering methods.

Given the values and functions of intermittent streams, and to acknowledge their contribution to the functioning of the stream system and wider environment, the Unitary Plan a greater level of control of activities in and adjacent to intermittent stream reaches is required.

Auckland wide Objectives and Policies

Chapter C: Auckland-wide objectives and policies – 5.14 Lakes, rivers, streams and wetland management

Policy 6: Structures and the Diversion of Surface Water

This policy sets out the circumstances where structures and associated diversion of surface water may be allowed. Generally this is only allowed where there is no reasonable or practicable alternative method or location for the activity.

Policy 7: Disturbance and Deposition of any Substance

Generally disturbance or deposition of any substance in, on or under the bed of a lake, river, stream or wetland is allowed only where there is no practicable alternative or where the activity is one of a list of appropriate activities.

Policy 8: Introduction and Planting of Plants

This is allowed where it is for habitat establishment, restoration or enhancement, amenity values, flood or erosion protection or stormwater control provided it does not cause flooding.

Policy 9: Reclamation and Drainage

This is to be avoided unless there is no reasonable or practicable alternative or where it is required as part of a restoration activity, to provide for significant infrastructure and it avoids effects on Mana Whenua values and interests.

Policy 10: Stock access to lake, river and stream beds

The adverse effects of stock access to water bodies are to be avoided.

Policies 11 & 12: Riparian margins

Protection and enhancement of riparian margins is achieved through the maintenance and enhancement of aesthetic, landscape and natural character values, the contribution of natural freshwater systems to the biodiversity, resilience and integrity of ecosystems and avoiding or mitigating the effects of flooding, surface erosion, stormwater contamination, bank erosion and increased surface water temperature.

Subdivision and development is required to enhance riparian margins in terms of their natural, ecological, and amenity values and linkages between areas of native vegetation and aquatic environments.

Activities, including structures and impermeable surfaces are to be designed to minimise adverse effects on the potential for regeneration of native vegetation, or on the extent, range and linkages between areas of native vegetation within riparian margins. Development including impermeable surfaces, earthworks and cantilevered structures, are to be avoided within the riparian margins of any lake, river, stream or wetland, except for infrastructure with a functional need to locate there.

Chapter C: Auckland-wide objectives and policies – 5.3 Vegetation management

The vegetation management policies require the protection of vegetation in sensitive environments including the coast, riparian margins, wetlands and areas prone to natural hazards.

Chapter D: Zone objectives and policies

The Rural Zones policies include reference to activities that are inappropriate within riparian yards. In the rural production zone, accessory farm and forestry buildings are to be avoided locating in riparian yards. In the rural coastal zone, buildings and other significant structures are not to be located in riparian margins, except for fences and structures with a functional need for such a location.

In the rural subdivision zone, building and access areas should be set back sufficiently to avoid adverse effects on the riparian margins.

In the countryside living zone, subdivision and development is to be located, designed and implemented to be sensitive to the site's environmental features to avoid vegetation removal or adverse effects on water quality, wetlands, riparian margins, and opportunities for environmental enhancement of existing areas of native vegetation, wetland areas, riparian margins or the coastal edge are identified and required to be actioned through the implementation of the development, including on an on-going basis.

Chapter C: Auckland-wide objectives and policies – Water: Stormwater Management

The Unitary Plan's stormwater management provisions include policies relating to the implementation of water sensitive design (WSD), consistent with the direction provided by the Auckland Plan and considered best practice stormwater management. The retention of natural hydrology, including intermittent streams and associated margins, is a cornerstone of WSD.

Application of the above policies to intermittent stream reaches is important to reflect the values of these reaches and their contribution to the functioning of freshwater systems and wider community and environmental outcomes.

2.1.2 Rules

Chapter H: Auckland-wide rules – 4.13 Lakes, rivers, streams and wetland management

Many of the rules and thresholds in 4.13 are similar to those of Chapter 7 of the ALW Plan. The consequence of the changes is that the rules now also apply to intermittent streams.

The following summarises the proposed activity status in relation to works typically undertaken in the bed of a lake or river, which will now apply to intermittent streams:

- Permanent stream diversion: Discretionary (not within a Management Area), Non Complying (Natural Stream Management Area)
- Culverts and fords: Permitted (not within a Management Area), Discretionary (Natural Stream Management Area)
- Erosion control structure: Permitted (not within a Management Area), Discretionary (Natural Stream Management Area)
- Disturbance for the purpose of channel clearance less than 100m in length: Permitted (not within a Management Area), Permitted (Natural Stream Management Area for recreational use, plant pest removal, access to a lawful structure or restoration and enhancement)
- Extension of an existing reclamation: Non Complying in all areas
- New reclamation: Non Complying in all areas

Riparian yards

Activities in riparian yards are controlled in a number of places in the Unitary Plan including:

- Development controls
- Earthworks
- Vegetation management

Zone development controls (in Chapter I: Zones rules)

The riparian yard provisions include a 10m building setback from permanent and intermittent rivers and streams and an impervious area threshold of 10%. This is applied in the residential, public open space, centres, mixed use, general business, business park, industrial, Maori purpose and retirement village zones. In the rural zones the setback is 20m from permanent and intermittent rivers and streams. In the quarry zone the setback is 10m where the river is 3m or wider.

Most building activities within the setback (riparian margin) are required to obtain resource consent.

Chapter H: Auckland-wide rules – 4.2 Earthworks

Earthwork activities within the riparian yard are controlled through a range of rules. Minor activities are generally permitted, with other activities subject to resource consent requirements.

General earthworks above 5m² are required to obtain resource consent as restricted discretionary activity.

Chapter H: Auckland-wide rules – 4.3 Vegetation Management

The rules generally provide for restricted discretionary activity status for vegetation management (pruning, alteration, removal) in riparian margins.

The application of these rules to intermittent stream reaches will increase the area in which some activities require resource consent, as highlighted above. Given the recently recognised values of intermittent streams, and their equivalent values to those of permanent reaches, it is appropriate that the same level of control be applied to them in terms of activities in the bed and activities in the riparian margins.

The efficiency and effectiveness of the rules has been tested through their development and application in the ALW Plan and District Plans to permanent streams. The removal of the threshold between the permanent and intermittent reaches should improve the administration of the rules by reducing the need for assessments of where the intermittent reach commences.

2.1.3 Costs and Benefits of Proposed Policies and Rules

A number of activities proposed in and adjacent to intermittent streams that previously did not require consent will now require consent and this may affect the extent or nature of these activities.

The primary benefits of this change are:

- A consistent approach to managing activities in and adjacent to rivers and streams reflecting current scientific knowledge;
- Elimination of the confusion regarding the boundary between intermittent and permanent stream reaches;
- Reduced loss and degradation of intermittent stream reaches, with consequential benefits to downstream areas including rivers and streams and coastal areas;
- An integrated approach to land use and freshwater management, in accordance with the NPSFM and the HGMPA;
- Contribution to the Auckland Plan outcomes of a Green Auckland and assists in giving effect to WSD opportunities by providing a higher level of management to important intermittent stream reaches;
- Improved community and environmental outcomes.

The primary costs associated with applying the provisions to intermittent streams include:

- A greater extent of land subject to resource consent requirements for activities such as building, earthworks and vegetation removal;
- Increased regulatory requirements, and associated costs, in respect of activities in the beds of intermittent lakes and rivers.
- Potential loss of developable land, although it is noted that adopting a WSD approach to new development, and protecting intermittent streams through the development process does not necessarily reduce development yield and value.

Analysis was performed for three different locations to understand the effect of the policy on developable land. These locations represent different topography and geology and ranged in size from 1,300 to 10,000 hectares. For example, one site is a catchment that is proposed to be urbanised completely in the north-west RUB area. The analysis looked at:

- a) the area that will be subject to control through a 10m riparian yard on permanent streams, and
- b) the proposed extension of the yard to intermittent stream reaches.

Results were consistent between the different study locations, suggesting that the environment type had did not have a significant effect. Analysis indicated that typically 9-11% of catchment area could be affected by a 10m riparian yard on permanent and intermittent streams. 8-9% of the catchment would be taken up by a riparian yard around permanent rivers and an additional 2-2.5% catchment area taken up by intermittent rivers.

2.1.4 Adequacy of Information and Risk of Not Acting

It is considered there is sufficient information on which to base the proposed policies and methods. A number of recent studies have highlighted the values of intermittent streams and that they are equivalent in value to permanent reaches.

The risk of not acting is the on-going loss and significant degradation of intermittent stream channels and the resulting loss of stream function and biodiversity values that intermittent streams provide. This will serve to limit the achievement of the Auckland Plan objectives and the national directives regarding green growth and the maintenance and enhancement of water quality and values. The unrestrained modification of intermittent streams will also frustrate the ability to give effect to water sensitive design, which is a key development approach of the Auckland Plan and other Unitary Plan provisions.

3 Alternatives

Alternative approaches have been considered through the development of the proposed provisions. The sections below identify and assess the key options and alternatives that have been considered in response to the issue that has been identified:

- Broadening of the management of rivers and streams to include intermittent streams; and
- Extending rural and urban riparian yards to include those alongside intermittent streams.

3.1 Management of Intermittent Streams

Introduction

Since the ALW Plan was developed, a significant programme of research has been undertaken to understand the values and management requirements of intermittent streams. This research into the catchment hydrology and in stream values of intermittent streams found that they are similar to permanently flowing streams. This was based on the findings that mud in intermittently flowing stream beds can act as a temporary refuge for some species, and that significant nutrient processing occurs in planted headwater wetlands and vegetation.

Furthermore, the intermittent habitats sampled showed additional invertebrate taxa to the permanent streams sampled, adding to overall biodiversity. In addition, intermittent streams play an important role in regulating stormwater flows and minimise the need for hard infrastructure.

Given the importance of these streams to the region's freshwater systems and biodiversity, an alternative management framework is warranted.

Options and alternatives

Options 1a and 1b evaluate the alternatives for the management of intermittent streams. These alternatives are:

- 1a. Status Quo
- 1b. Broadening of the management of freshwater systems to include intermittent streams (proposed)

Option 1a – Status Quo is the continued use of the policy, objective and rule framework that currently exists in Chapter 7 of the Auckland Council Plan, Air, Land and Water (ALW Plan) in relation to the management of permanent rivers/streams and intermittent streams. The corresponding Rules in relation to activities within the bed of a lake or river place an emphasis on permanent rivers and streams and in particular discourage permanent channel reclamation with a non-complying activity status.

Option 1b – Broadening of the management framework for activities in the beds of lakes and rivers to intermittent reaches to reflect their values and contribution to freshwater systems. This proposal does not prevent works taking place, but requires consents to be sought for activities, with a non-complying activity status for permanent reclamation.

| Intermittent Streams | | |
|----------------------|--|--|
| | Option 1a: Status Quo | Option 1b: Broadening of intermittent stream management framework (preferred) |
| Appropriateness | <ul style="list-style-type: none"> Research undertaken by the Council has enabled a better understanding of the role that intermittent streams play in terms of contribution to matters such as aquatic habitat and water quality outcomes for freshwater systems. With this knowledge it would be inappropriate to continue with the current management framework for intermittent streams which results in unrestricted and irreversible loss of these important resources. To continue the current management framework would be to the detriment of the principles of achieving continuity of freshwater systems from the headwaters to the coast affecting the values held for the intermittent streams and downstream environments. The current framework for management of intermittent streams is not in keeping with the principles of Water Sensitive Design and Green Growth of the Auckland Plan. | <ul style="list-style-type: none"> This option is considered to be the most appropriate as it enables management of rivers and freshwater systems from the headwaters to the coast. This enables the full benefits of such systems to be realised and managed in a more holistic manner with improved freshwater habitat and freshwater quality at the forefront of resource management decisions relating to works in the beds of lakes and rivers. Determination of the 'boundary' between permanent and intermittent streams has at times resulted in inconsistent and fragmented decisions. The proposal to view these stream types as continuous systems will contribute to better decision making and improve outcomes in terms of freshwater system management. |
| Effectiveness | Maintaining the status quo would be ineffective in the management of and the principles of a freshwater system as the likely outcome would be the continued fragmented management of stream channels focusing only of the benefits provided by the permanent sections. This would also lead to on-going and irreversible loss of important freshwater systems and resources. | <ul style="list-style-type: none"> This option will provide for a more effective management framework for freshwater systems and better integrates land use and water quality outcomes that are available under the Unitary Plan. This approach provides for management of complete freshwater systems enabling more sustainable management of natural and physical resources. This option is likely to achieve improved environmental outcomes and wider social, Mana Whenua, amenity and economic benefits associated with the improved management of natural systems and processes. This option will be effective in achieving the outcomes sought with respect to freshwater management giving effect to the requirements and direction of the NPSFM, NZCPS, HGMPA and Auckland Plan. |
| Efficiency | <ul style="list-style-type: none"> This option is efficient to the extent that it does not require any regulatory process to modify or pipe an intermittent stream. However, it is inefficient in achieving the outcomes and objectives on the Auckland Plan and the sustainable management purpose of the RMA. Viewing permanent and intermittent streams as separate systems is inconsistent with the management of streams as continuous freshwater systems from the headwaters to the coast. | <ul style="list-style-type: none"> This option provides a more efficient approach to the management of permanent and intermittent streams by appropriately viewing them as a continuous and integrated system. This will contribute to more efficient and effective decision making and resource management. |
| Costs | <ul style="list-style-type: none"> This option has low regulatory cost. Assessments are required to define the boundary between intermittent and permanent reaches. The status quo does not address the key issues associated with the management of freshwater systems. This will inevitably result in the continued and irreversible loss and degradation of freshwater systems with associated environmental, social, Mana Whenua and economic costs to the region. | <ul style="list-style-type: none"> There will be increased regulatory costs for activities proposed within intermittent streams which were previously relatively permissive. There will potentially be a cost to land development given there will be a regulatory framework for activities proposed in the bed of an intermittent stream and loss of developable land. However, this may not be the case under a water sensitive design approach to new development. |
| Benefits | <ul style="list-style-type: none"> The current separation in terms of management philosophy between permanent and intermittent streams is the established convention in the Auckland Region and dates back to the notification of the ALW Plan and has been subject to extensive negotiations. Various revisions in terminology (e.g. Category 1 and 2) have been implemented. This approach enables unrestricted development to take place in the beds of intermittent streams (but with associated costs and drawbacks). | <ul style="list-style-type: none"> This option will provide a better outcome enabling the management of streams as freshwater systems being continuous from the head water to the coast. This option will assist in the protection and enhancement of values freshwater resources. This option gives effect to the NPSFM, NZCPS, HGMPA, the Auckland Plan and the principles of Water Sensitive Design and Green Growth. Better managing intermittent reaches may reduce requirements for constructed stormwater infrastructure and associated maintenance costs. |
| Risks | The key risk associated with this option is the irreversible loss of Auckland's freshwater resources and associated biodiversity if reclamation and modification of intermittent streams continues, resulting in a contribution to the degradation of Auckland's freshwater and marine systems. | <ul style="list-style-type: none"> There may be a lack of 'buy in' by the community to the principles of Water Sensitive Design which this option contributes to. Requiring a regulatory process for activities does not ensure the outcomes that will be achieved. |

3.2 Riparian Yards

Introduction

Riparian yards are proposed in the Unitary Plan to have a 20m width in rural areas and a 10m width in urban areas. The proposed change to the management framework for beds of lakes and rivers in respect of the intermittent stream sections requires consideration of the application of the riparian yards to the intermittent sections.

Options and alternatives

Options 2a, 2b, and 2c evaluate the alternatives for extension of the riparian yard zones to be adjacent to intermittent sections in addition to permanent sections. There alternatives are:

- 2a: Riparian yards only adjacent to permanent stream sections in rural and urban areas;
- 2b: Riparian yards adjacent to permanent and intermittent stream sections in rural and urban areas; and
- 2c: Variable riparian yard widths with intermittent sections in rural and urban areas having a 5m width. Permanent sections remain at 20m for rural areas and 10m for urban areas.

Option 2a – Riparian yards and associated controls applying only to permanent stream sections.

Option 2b – Achieves consistency with the proposed management framework for beds of lakes and rivers whereby riparian yard zones are proposed to be applied across intermittent and permanent stream sections throughout the region.

Option 2c – Applies similar principles to Option 2b, but reduces the riparian yard zone in intermittent stream sections in rural and urban areas.

| Riparian Yards | | | |
|-----------------|---|---|--|
| | Option 2a: Permanent Only | Option 2b: Permanent and Intermittent (preferred) | Option 2c: Variable Riparian Widths |
| Appropriateness | <ul style="list-style-type: none"> This option is not considered appropriate to achieve the outcomes sought in relation to freshwater systems. The application of riparian yard zone controls which are only adjacent to permanent stream section is inconsistent with the proposed rules framework relating to beds of lakes and rivers. This option is inconsistent with the principle of management of freshwater systems which includes margins and flood plains. Research indicates there is little reason to differentiate the management of permanent and intermittent streams. The RMA definition of river means 'a continually or intermittently flowing body of fresh water'. | <ul style="list-style-type: none"> This option is considered to be the most appropriate as it contributes to the fulfilment of managing streams and rivers as freshwater systems from the headwaters to the coast and enables the full benefits of such systems to be realised and managed in a more holistic manner. This option is consistent with the scientific research, which indicates the values and contributions of intermittent and permanent streams are equivalent. | <ul style="list-style-type: none"> While this option does adopt riparian yard zones throughout the stream system, reducing the zone width to 5m for intermittent stream sections is considered an inappropriate option in relation to the management of natural freshwater systems and requires the on-going use of the arbitrary distinction between permanent and intermittent reaches. |
| Effectiveness | <ul style="list-style-type: none"> This option is not viewed as being an effective means to provide for the integrated management of freshwater systems as it excludes intermittent stream sections from having adjacent riparian yards with corresponding rules. The principle of providing for continuity in management from the headwaters to the coast will not be realised with this option as differing approaches to land management will result in inconsistent outcomes for the intermittent streams sections. The arbitrary definition of permanent and intermittent streams in the ALW Plan is not supported by current scientific research. | <ul style="list-style-type: none"> This option will provide for a more effective management framework for freshwater systems and better integrates land use and water quality outcomes that are available under the Unitary Plan through the consistent application of riparian yard zones. This approach provides for management of complete freshwater systems enabling more sustainable management of natural and physical resources and contribution to the principles of water Sensitive Design and Green Growth. This option is likely to achieve improved environmental outcomes and wider Mana Whenua, social, amenity and economic benefits associated with the improved management of freshwater systems. This option will be effective in achieving the outcomes sought with respect to freshwater management giving effect to the direction of the NPSFM, NZCPS, HGMPA and Auckland Plan. | <ul style="list-style-type: none"> This option is not an effective means of applying riparian yard zonings as it will be more complex to administer e.g. determination of intermittent sections. The application of a reduced width for intermittent stream sections will result in only a marginal (perceived) benefit with respect reducing zoning restrictions, but will have a detrimental effect in terms of realising the intended outcomes of freshwater system management. |
| Efficiency | <ul style="list-style-type: none"> This option would be inefficient as it proposes to apply the riparian yard zones in manner which is inconsistent with the proposed beds of lakes and river rule framework and the principle of managing streams as freshwater systems. | <ul style="list-style-type: none"> This option provides a more efficient approach to the management of permanent and intermittent streams by appropriately viewing them as a continuous and consistently managed system. The application of riparian yard zones from the coast to the headwaters of stream systems is an efficient means of contributing to the management of freshwater systems. | <ul style="list-style-type: none"> The complications associated with determining the boundaries between intermittent and permanent stream sections are not an efficient means of applying the riparian yard zonings and may be inequitable and inconsistent. |
| Costs | <ul style="list-style-type: none"> This option will not realise the consistent and integrated management of freshwater systems. This option does not reflect the findings from scientific research which indicates intermittent streams should be treated the same as permanent streams due to their value and contribution to freshwater systems. This option will result in a fragmented approach to freshwater system management and corresponding environmental outcomes, with associated social and economic costs. Increased long term stormwater asset management costs as hard infrastructure may be needed to replace intermittent streams (such as renewals). | <ul style="list-style-type: none"> This option will result in an increased regulatory cost associated with activities in riparian yards. The implementation of riparian yard zones across the region will introduce land use restrictions for private properties in rural and urban areas that do not currently exist. | <ul style="list-style-type: none"> This option will result in an increased regulatory cost associated with activities in riparian yards (but will be slightly less than Option 2b). The implementation of riparian yard zones across the region will introduce land use restrictions for private properties (but slightly less than Option 2b) in rural and urban areas that do not currently exist Each stream in the region will need to be surveyed to determine the boundary between the permanent and intermittent sections. |
| Benefits | <p>The lack of a riparian yard zoning adjacent to intermittent steam sections is reflective of the current management status throughout much of the Auckland Region. This therefore allows greater flexibility for land owners and more extensive land development.</p> | <ul style="list-style-type: none"> This option is consistent with the strategic direction of the Auckland Plan and Unitary Plan and is likely to lead to improved stream outcomes. This option is consistent with the principles of Water Sensitive | <ul style="list-style-type: none"> Slightly reduced consent and regulatory processes associated with intermittent riparian yard zones in comparison to Option 2b. The environmental benefits are likely to be similar to Option 2b, but reduced. |

| | | | |
|-------|--|---|--|
| | | <ul style="list-style-type: none"> • This option should lead to improved environmental, community and Mana Whenua outcomes. • This option will provide the terrestrial environment required to sustain the aquatic environment. • This option will provide the full range of stormwater conveyance benefits, including provision of re-charge areas and flood storage. • This option will promote the full range of in-stream nutrient and other contaminant processing, taking advantage of the retentive and dynamic nature of intermittent streams. • Reduced long term stormwater asset management costs (such as renewals). | <ul style="list-style-type: none"> • This option will provide the terrestrial environment required to sustain the aquatic environment, similar to Option 2b but reduced. • This option will provide stormwater conveyance benefits, including provision of re-charge areas and flood storage, similar to Option 2b but reduced. • Reduced long term stormwater asset management costs (such as renewals) |
| Risks | <ul style="list-style-type: none"> • The key risk associated with this option is that the potential benefits associated with managing permanent and intermittent streams as continuous systems (with equal status in terms of riparian yard zoning) will not be realised resulting in the continued degradation of Auckland's freshwater and marine systems. • This option is likely to significantly negatively affect the downstream permanent stream, both in terms of modified hydrology and ecological factors. • Insufficient re-charge to sustain stream baseflows. • Elevated flood risk due to loss of floodplain areas associated with riparian margins. | <ul style="list-style-type: none"> • The key risk associated with this option is the scale of rezoning private property to include the riparian yard zones and the public perception associated with the restrictions that will be placed on activities within these zones. • Riparian yard zones may not significantly benefit stream protection for intermittent reaches | <ul style="list-style-type: none"> • The key risk associated with the selection of this option is that it will achieve only a marginal benefit by reducing the riparian yard width for intermittent stream reaches, however the corresponding lack of consistency in managing freshwater systems will result in a contribution to the continued degradation of Auckland's freshwater and marine systems. • Diminished re-charge to sustain stream baseflows. |

4 Conclusion

The proposed management options identified above (preferred Options 1b and 2b) in the proposed Unitary Plan are considered the most appropriate to achieve the outcomes sought for freshwater system management. In particular, they provide the most appropriate approach to:

- Giving effect to the research highlighting the values of headwater streams in Auckland, concluding that they have significant biodiversity values equivalent to those of permanently flowing streams.
- Enable the multiple aspirations in the Auckland Plan, including community and Mana Whenua to be met such that Auckland can grow and intensify in a sustainable manner consistent with the green growth vision and contributing to the principles of water sensitive design.
- Giving effect to the visions, objectives and performance measures in the Indigenous Biodiversity Strategy, particularly achievement of healthy and diverse ecosystems, contribution to ecosystem services and integrated management.
- Giving effect to the national requirements of the RMA, NPSFM, NZCPS and HGMPA and in particular the expectations regarding improving and maintaining the quality of freshwater systems and their connection to downstream marine environments.
- Remediating the largely arbitrary distinction between permanent and intermittent streams, and their corresponding management in the ALW Plan.
- Giving effect to the objectives and policies in the Unitary Plan and protection of freshwater systems which promote holistic management with corresponding social, cultural and economic benefits.
- Giving effect to the research highlighting the values of headwater streams in Auckland and the importance of managing these as a component of freshwater systems.

5 Record of Development of Provisions

5.1 Information and Analysis

The following reports provide the primary technical basis for the proposed change in approach to stream management:

- Appendix 3.27.1 - Proposed Plan Change 23: Riparian Margins, Report prepared for North Shore City Council by Golder Associates, 2008
- Appendix 3.27.2 - Small headwater streams of the Auckland Region Volume 1: Spatial extent. Report produced by NIWA for Auckland Regional Council, Technical Publication 313, 2006
- Appendix 3.27.3 - Small headwater streams of the Auckland Region Volume 2: Hydrology and water quality. Report produced by NIWA for Auckland Regional Council, Technical Publication 312, 2006.
- Appendix 3.27.4 - Small headwater streams of the Auckland Region Volume 3: Nitrate and phosphate removal. Report produced by NIWA for Auckland Regional Council, Technical Publication 311, 2006.
- Appendix 3.27.5 - Small headwater streams of the Auckland Region Volume 4: Natural values. Report produced by NIWA for Auckland Regional Council, Technical Publication 310, 2006.

Further references are provided below.

5.2 Consultation Undertaken

In addition to the broader Unitary Plan consultation, the following has been undertaken:

- Internal workshops and discussions with Stormwater Unit, Freshwater Policy, Research, Investigations and Monitoring Unit, Natural Resources Specialist Input Consenting team and the Environmental Services Biodiversity team around the management of intermittent streams.
- Taken to Mana Whenua hui North and South in March and October 2012.
- Discussed with stakeholder and sector workshops – conservation and environmental organisations and Rural Advisory Panel.
- Taken to External Oversight Group in October 2012.

5.3 Decision-Making

The Political Working Party for the Unitary Plan supported the proposal to manage intermittent streams to the same extent as permanent streams.

5.4 Further References

- Bernhardt E, Likens G E, Hall R O, Buso D C, Fisher S G, Burton T M, Meyer J L, McDowell W H, Mayer M S, Bowden W B, Findlay S E G, Macneale K H, Stelzer R S and Lowe W H (2003). Can't see the forest for the stream? In-stream processing and terrestrial nitrogen exports. *Bioscience* 55: 219–230
- Bond N R and Cottingham P (2008). Ecology and hydrology of temporary streams: implications for sustainable water management. eWater Technical Report. eWater Cooperative Research Centre, Canberra.
http://ewatercrc.com.au/reports/Bond_Cottingham-2008-Temporary_Streams.pdf
- Dunne T and Leopold L B (1978). Water in environmental planning. W H Freeman and Company, New York
- Fisher S G, Sponseller R A and Heffernan J B (2004). Horizons in stream biogeochemistry: flowpaths to progress. *Ecology* 85: 2369–2379
- Levick L, Fonseca J, Goodrich D, Hernandez M, Semmens D, Stromberg J, Leidy R, Scianni M, Guertin D P, Tluczek M and Kepner W (2008). The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046
- McDonough O T, Hosen J D and Palmer M A (2011). Temporary streams: the hydrology, geography, and ecology of non-perennially flowing waters. In: River Ecosystems: Dynamics, Management and Conservation. Editors Elliott H S and Martin L E. Nova Science Publishers, NY, pp 259 – 289
- Meyer J L (2003). Aquatic scientists comment on Docket ID OW-2002-0050. <http://www.rivercenter.uga.edu/publications/pdf/anprmcomments.pdf>

- Moore R D and Richardson J S (2003). Progress towards understanding the structure, function, and ecological significance of small stream channels and their riparian zones. *Canadian Journal of Forest Research* 33: 1349–1351
- Peterson B J, Wollheim W M, Mulholland P J, Webster J R, Meyer J R, Tank J L, Marti E, Bowden W B, Valett H M, Hershey A E, McDowell W H, Dodds W K, Hamilton S K, Gregory S and Morrall D D (2001). Control of nitrogen export from watersheds by headwater streams. *Science* 292: 86–90
- Vannote R L, Minshall G W, Cummins K W, Sedell J R and Cushing C E (1980). The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences* 37: 130–137