Part 5 Conservation of Natural Features

5.1 Conservation Issues

5.1.1 Indigenous Ecosystems

In New Zealand alone, the annual value of terrestrial INDIGENOUS BIODIVERSITY in 1994 wa estimated at $46 billion. Marine ECOSYSTEM services were valued at $183 billion per year. This equates to a benefit to the economy more than twice the 1997 gross national product of New Zealand (Patterson & Cole, 1997). Ecology is a relatively young science. Like all sciences it is dynamic and evolving in terms of theory as well as practice. The noun ‘Ecology’ is derived from the Greek oikos, meaning ‘household’, and logos, meaning ‘study’ (Odum, 1983). Ecology is the study of the environmental house, which includes all the organisms in it and all of the functional processes that make the house habitable. Although ecology has close links with ‘pure’ biology, it has emerged in the last three decades as an essentially holistic discipline. Ecology unites biological and physical processes and links the natural sciences with the social sciences (Odum, 1983). This study of these links of ecological situations with societal factors has further increased since 1983 (International Union for Conservation of Nature and Natural Resources - IUCN, 1987).

The term ECOSYSTEM describes communities of organisms and their interactions with their environment and covers the linkages between the physical and natural environment. Habitats are places where certain organisms are found, while biomes are the major types of ecological community, such as WETLANDS, coral reefs or humid forests. A biome might contain a number of different habitats (Odum, 1983). An ECOSYSTEM may cover the linkages between the biomes, their abiotic components such as soils and water, and the organisms found within it. The characteristic of these linkages is one of inter-dependency, such that changes in one component will have an effect upon the quantity and quality of others. These effects may often be described as synergistic. Such linkages would also include the relationships of humans with their environment (Odum, 1983).

Franklin is blessed with a diverse array of indigenous fauna and flora habitats. The habitats reflect the diverse biological and physical templates over which the ecosystems have formed.

As a consequence of human occupation, many of these sites are now tiny remnants of natural habitats, which once covered the whole district. In particular, the rich fertile lowlands and desirable coastal margins have been cleared of vegetation in order to provide for the economic and social backbone for Franklin’s communities today. Accordingly, wetlands, lowland forests and coastal forest have been most affected by land clearance, drainage and gradual degradation. In two of the 6 Ecological Districts, which are present in Franklin, the figures make for stark reading. As Emmett et al (2000) state:

1. Manukau E.D. comprises some 62,500ha, but only c. 947ha (1.5%) retains any indigenous vegetation cover. The remaining vegetation is made up of 296 fragments of forest, scrub or wetland, with the majority of sites (85%) less than 5ha.
2. The Awhitu E.D comprises some 29,000ha, and is slightly better off with 2,064ha (7.2%) of extant indigenous vegetation. This comprises 209 scattered sites of forest, scrub and wetland, with most occurring in the central uplands of the Awhitu Peninsula on hill slopes and gullies.

While much of the upland tawa/rimu/beech/broad-leaved forests are protected in public estate these

lowland habitats are, for the most part, owned by private landowners. Yet these habitats are now the most rare and threatened of the natural features left within the district. The most under-represented habitat types are:

(a) Lowland (conifer/kahikatea/totara) forest types

(b) All taraire forest types

(c) Kauri dominant forest types

(d) Indigenous swamp forest types

(e) Raupo/flax/cabbage tree dominated wetland types

(f) All pohutukawa/semi-coastal forest types

(g) Dune lakes

(h) Coastal cliff flaxland types

(Source: Kessels, G. (2002) 'Franklin District Council: Ecological Features of the District and Options for Management')

Each of the 6 ecological districts that are present in Franklin has specific issues relating to indigenous ecosystems:

1. The Awhitu Ecological District has approximately 650ha of indigenous habitats intact largely in private ownership. A number of small dune formed lakes and wetlands characterise the southern Awhitu. The main threats are stock intrusion and possum browsing.
2. The Manukau Ecological District is characterised by small fragmented remnants with the key threats being stock intrusion, possum browsing, human impact and weeds.
3. The Hunua Ecological District has large tracts of native forest in private ownership contiguous with ARC and DOC estates. The wetland/estuarine habitats of the Firth of Thames are of international significance. Threats in this district include stock, goat, pig and possum intrusion, cat and mustellid predation at Miranda, weed intrusion and human impacts.
4. The Raglan Ecological District has reasonably large and rare forest type tracts, which is threatened by stock intrusion and possum browsing.
5. The Meremere Ecological District is characterised by remnant wetlands and the Whangamarino and Mangatawhiri wetlands. There are also large tracts of kanuka forest left which provide important wildlife habitats. The threats to the wetlands are stock intrusion, possum browsing and weed intrusion. Issues surrounding use and provision of information are prevalent to landowners and other agencies as well as accuracy of that information.
6. Franklin dissects a small portion of the Hauraki Ecological District. Within this ecological district lowland forest (totara, kahikatea) forest remnants provide ecological 'stepping stones' that links the Hapuakohe ranges forest with the Hunua forests.

The key threats for the remaining natural areas within these ecological districts can be summarised as:

(a) Stock intrusion into unfenced forest/shrubland/wetland areas.

(b) Animal and plant pest degradation of all indigenous fauna and flora habitats.

(c) Degradation of the margins of estuarine wetlands and lakes by stock.

District Plan Approach

Intensification of subdivision adjacent to natural habitats could cause significant adverse ecological

effects and should therefore be adequately controlled. The use of incentives such as subdivision opportunities provides a mechanism to encourage the fencing off of natural indigenous areas and ecosystems.

The removal of indigenous vegetation and indigenous fauna and flora habitats can adversely impact upon maintaining the district's remaining bio-diversity. Requiring resource consents for the removal of significant indigenous vegetation is necessary to ensure appropriate management.

5.1.2 Bird Habitats

Horticultural and 'lifestyle' block development in the Karaka and Waiau Pa areas is placing pressure on the wading bird habitat along the southern shores of the Manukau Harbour. Some practices, such as shelter belt planting, can render land adjoining the foreshore unsuitable for bird roosting. Activities such as lifestyle block development that result in a greater human presence, and consequently domestic animals, on or near the foreshore pose a particular threat to the habitat. Degradation of the quality and quantity of natural freshwater available to the habitat, as a result of damming and other practices, is also of concern.

The Hunua Ranges contain large tracts of indigenous vegetation and provide an extensive habitat for terrestrial birds. A significant part of the area is under public protection, including a Regional Park and water catchments and while other parts of the area are in private ownership, development pressures are, with some exceptions, relatively low. Elsewhere inland bird habitats are largely fragmented and under threat from the significant pressures on local ecosystems, particularly in the more developed areas of the district.

Similarly, the wading bird habitat and wetlands on the shores of the Firth of Thames, which have been identified as a RAMSAR area for migratory birds, are potentially at risk. Unrestricted public access to the fragile wetland environment and important roosting and nesting areas in the chenier shell plains is undesirable. As with the southern shores of the Manukau, land uses that result in a greater human presence on or near the foreshore have the potential to damage this internationally important habitat. Further housing development and mineral exploitation pose a particular threat.

District Plan Approach

Implementing coastal development setbacks are the means within the control of Council through which it can best support the protection of habitats.

5.1.3 Landforms

The Miranda Chenier Plain and Whakatiwai Gravels are outstanding landforms on the western coastline of the Firth of Thames. Quarrying is a potential threat to the integrity of these landforms. Quarrying and development activities also threaten other landforms in the district.

The Franklin area contains numerous volcanic craters, shield volcanoes and scoria cones that contribute to the distinctive character of the district.

The important landscape values of Pukekohe Hill are being compromised by urban development and some horticultural practices such as shelter belt planting.

5.1.4 Geological Features

The sequence of greywacke rocks south of the Waikato River provides an important record of the history of this part of New Zealand and its biota as it lay along the coast of the ancient continent of Gondwana between 120 million and 200 million years ago. The limestone and papa rocks that overlie these older rocks document several significant episodes of submergence beneath the sea and intervening upheavals that affected Franklin between 40 and 20 million years ago. The best exposure of representative examples of these rocks need protection and management for future generations to study and learn from.

5.1.5 Water Bodies

Aquifers

The significant aquifers in the district are the shallow ones in the volcanic formations around Pukekohe/Bombay and Pukekawa. In the northwest there is a deeper sedimentary formation – the Kaawa formation which is fault defined. As well as these resources, there are other less productive aquifers of local importance.

The regional boundary cuts across the Kaawa and the Pukekohe/Bombay aquifers. There is a reasonable amount of coordination in the management of these aquifers across the boundary, though inevitably the two regional Councils have different priorities within their own regions.

The volcanic aquifers are a significant source of springs feeding streams draining around the peripheries of the volcanic areas. As a result, contamination of these aquifers is doubly significant in that the streams also suffer the consequences. These aquifers are also recharged by direct infiltration over highly utilised, high quality soils, directly determining their susceptibility to contamination.

District Plan Approach

In regard to addressing aquifer contamination, improving land management has been adopted as the more preferable approach to a more interventionist regulation of fertiliser use. As a result, the Franklin Sustainability Project, with Council supports, has looked to improve land management practices in the volcanic soil areas.

Streams

While intense agricultural use and some urban activities have resulted in degraded streams in much of Franklin, there are some that are less impacted. Within the scope of Franklin, is the opportunity to improve the health of both high quality and degraded streams through riparian margin management and protection.

Building adequate buffers of diverse vegetation enhances stream life by providing shade to the streams. In addition, reducing stock access and minimising road crossings of streams also contributes to the protection of riparian margins.

District Plan Approach

Implementing development setbacks are the means within the control of Council through which it can best support riparian margin protection.

5.1.6 The Coastal Environment

Franklin has more than 170km of coastline ensuring that a large proportion of the district has a coastal character that is reflected in the landscape, villages and the district's residents. There are opportunities and constraints associated with the management of the coast of Franklin, particularly concerning natural character, public access and coastal hazards. Physiographically, the coast of Franklin can be defined by three areas being the Tasman Coast, the Manukau Harbour Fringe and the Seabird Coast. These coastal areas have been used as the basis for the Management Areas approach as described in Part 16.

1. The Tasman Coast

The Tasman Coast can be broadly separated into three subsections.

(a) *Western Margin of rhe Awhitu Peninsula:*

This is a relatively straight section of coast, which extends 40km from the entrance of the Manukau Harbour south to Port Waikato. It is characterised by a narrow beach backed by a steep bluff that typically rises to 120-190m above sea level. Roads are generally 1.5-3km inland and there is no direct road access to the coast apart from at Karioitahi Beach or Hamilton's Gap (Waimatuku)

(b) *Port Waikato:*

This area comprises the entrance of the Waikato River and a large sand spit located on the southern margin of the entrance. Extensive wetlands occur in the upper reaches of the estuary. A small settlement is located at the southern end of the sand spit.

(c) *The Coast South Of Port Waikato:*

A rugged and irregular coast with a wide range of landforms including stream valleys and entrances, bluffs and cliffs, ocean beaches, sand dunes and occasional headlands (e.g. Ngatatura Point) which often display vestiges of former pa sites and other Maaori habitation (Boffa Miskell, 1998). There is no road access to the coast and the area has a low settlement density with a remote, rural character.

Sand country is common right along the coast and severe blowouts, migrating dunes and sand sheets can develop where vegetation is disturbed.

Natural Character

The coastal environment retains a very high level of natural character with an almost complete absence of human built structures, particularly the area from the coastal margin to at least the top of the ridgeline or escarpment immediately landward. Apart from the settlement of Port Waikato, buildings and dwellings are sparse and almost all located several hundred meters landwards of the top edge of the bluff – the land in these areas often relatively flat. This, combined with limited road access, strong prevailing westerly winds and high wave energy provides a wild, rugged and remote character to the coastline. The Manukau Heads, Tipitai Point, Taratara Point and Te Pirau Point are very significant to the natural character of the Manukau Harbour and Tasman Coast and these should be kept free of development because of their outstanding visual prominence, cultural and ecological significance in relation to coastal natural character. These are highly valued regional landscapes.

The coastline also contains various significant geological sites and features. For instance, various sections of coastal cliffs south of Port Waikato, particularly the areas between Huriwai River and Waikawau Stream, Waiwiri Beach (immediately south of Otangaroa Stream) and the Ngatatura Point and the area immediately north (Kenny and Hayward 1996a). Sand deposits of geological significance also occur at Karioitahi and Cochrane's Gap (Kenny and Hayward 1996a). Important geological sites also occur along the south-eastern margin of the Port Waikato Estuary (Kenny and Hayward 1996a).

There is also some damage to critical coastal margin environments, particularly coastal dunes. This damage arises from off-road vehicles and stock access and in places leads to serious damage to dunes and to inland migrating sand sheets. Poor farm management is also leading to problems of sand instability on sand country along the coast.

Public Access

Road access to the coast is extremely limited, occurring at only three locations along the entire length. Therefore there is limited public access to the coast. Access along the coast is largely by way of off-road vehicles along the beach from road access points.

While it is desirable to improve public access to the coast over time, experience at existing sites (particularly Karioitahi) indicates that public access can lead to significant management issues, probably reflecting the remote nature of the coast. The problems include vandalism of public property, abandoned vehicles, issues of off-road vehicles (e.g. damage to dune vegetation leading to wind erosion), user conflicts and safety concerns.

District Plan Approach

Where coastal areas are subject to erosion and sand movement, sustainable land management practices for the ongoing management of these areas such as appropriate planting and erosion control measures should be promoted. Improved public access needs to be carefully managed and controlled.

2. The Manukau Harbour Fringe

Manukau Harbour Fringe extends from the Manukau Harbour entrance to Hingaia. Geomorphologically, the coastal margin is diverse with a wide variety of coastal environments including beaches, headlands, cliffs and estuarine ecosystems.

The southern margin between Clarks Beach and Papakura includes low-lying rural flatlands, low terraces and rolling topography - deeply indented by various estuarine creeks (Waiuku River, Taihiki and Clarks Creeks, Pahurehure Inlet including Drury Creek) with extensive mangroves and productive intertidal estuarine wetlands.

The western margin of the harbour borders Awhitu Peninsula (a Pleistocene dune feature) with terraces backed by higher and steeper areas. The coastal margin is indented, consisting of a succession of inlets and headlands - particularly to the south of Matakawau and within the Waiuku River. Biologically productive estuarine wetlands commonly occur within the sheltered inlets, with upper reaches often lined with mangroves.

Beaches and coastal cliffs also occur in many areas along the western and southern coasts.

Settlements occur at Clarks, Waiau and Glenbrook beaches. Other coastal settlements are scattered, typically traditional bach areas such as Grahams Beach and Matakawau Point. Areas closer to the Southern Motorway such as Karaka are also coming under pressure for rural lifestyle development.

Natural Character

In general, much of the coast remains relatively free of dwellings in close proximity to the coastline and retains a high level of natural character.

There are also a number of very special coastal areas with outstanding natural character that will need careful and particular management. In general, subdivision, dwellings and major earthworks should be precluded – though there may be limited opportunity for development towards the landward margin of some of the areas. Those areas that are considered to have special coastal character and are particularly sensitive to change are outlined below:

(a) *Clarks Beach to Seagrove and Ellets Beach to Karaka Point:*

The area of foreshore retains outstanding natural character and also lies along the landward margin of significant intertidal wetlands that are also an important feeding area for wading birds. The area also encompasses the two most numerically important bird roost areas on the harbour (Seagrove and Karaka). The major portion of the Ellets Beach to Karaka Point foreshore is ranked as a Coastal Protection Area 1 in the Regional Plan: Coastal, and the roost and adjacent intertidal banks at Seagrove are ranked an Area of Special Conservation Value by the Department of Conservation.

(b) *Pollok Spit:*

The coastal environment in this area maintains a very high natural character. The spit and Rangiriri Creek also have significant wildlife and ecological values and are ranked as Coastal Protection Areas in the Regional Plan: Coastal and as an Area of Special Conservation Value by the Department of Conservation. Wairoa Point is also an outstanding natural headland.

(c) *Awhitu Regional Park and Environs:*
This foreshore area has outstanding natural character and includes two attractive undeveloped beaches and estuarine wetlands. Scheduled as a Coastal Protection Area 1 in the Auckland Regional Plan: Coastal and as an Area of Special Conservation Value by the Department of Conservation.

(d) *Waipipi Creek Roosts*
Development needs to be carefully controlled in the Gordon Landing and Waipipi Wharf Road promontory areas close to the significant ecological areas of the Waipipi Creek and bird roosts.

(e) *Headlands and Promontories:*
The seaward end of all identified promontories and major headlands are very significant to the natural character of the harbour and these should be kept free of development because of their outstanding visual prominence, cultural and ecological significance in relation to coastal natural character. The headlands and promontories of the Western Needles, Kelly's Landing, Dickey's Landing-Kauri Road, Andrew Pye Road, Kauri Point, Mako Point and the headland between Wattle Bay and Orua Bay are highly valued regional landscapes.

Another significant issue in relation to natural character around the margin of the Manukau Harbour is the widespread degradation of critical coastal margin environments, particularly soft shore margins (i.e. beaches and estuaries).

These margins play a very significant role in the natural character and ecology of harbour environments – including:
These critical coastal margin environments have often been significantly modified by a range of human activities around the Manukau Harbour.

Riparian vegetation is almost always absent along the landward margins of estuarine wetlands as a consequence of land use activities pushing right to the harbour edge and/or the desire to maintain extensive sea views from local dwellings. In some cases, even the salt marsh and other maritime environments have been truncated or degraded by coastal structures, drainage, levees, reclamation and/ or stock access.

Similarly, beach and dune environments have often been damaged or degraded by earthworks, coastal structures (especially shoreline armouring and storm water outlets) and other activities. The severe degradation of coastal margin areas around existing coastal villages/settlements (such as Clarks, Glenbrook and Grahams beaches) illustrate the potential for damage to coastal beach environments and associated coastal values if adjacent subdivision and development is not carefully designed and managed.

However, in most rural areas, there is still very high potential for the protection and restoration of degraded coastal margins. This should be given emphasis in the future management of the coastal environment around Manukau Harbour.

A final and more subtle issue in relation to the preservation of the natural character of the harbour margin is the need to maintain the ability of harbour margins to respond to the effects of projected climate change, including sea level rise. In particular, this will be critical to the maintenance of

biologically productive estuarine wetlands. This matter needs to be given very careful consideration before any development of low-lying areas or harbour margins. Adequate setback should be provided to allow for any landward expansion of wetlands in response to sea level rise. As a general rule, further subdivision and development should be precluded in low-lying areas likely to be vulnerable to erosion or inundation within the next 100 years.

Public Access

There is an extensive roading network around the Manukau Harbour and, together with easy topography; this provides the potential for easy coastal access in most areas.

However, public access to the coast is severely limited in many areas. This is particularly the case along the southern shoreline from Hingaia Bridge (Drury Creek) to Clarks Beach where there is little to no direct public access to the coast.

As maintaining and enhancing public access is a matter of national importance, management and development around the harbour should also give a high priority to the enhancement of public access to and along the coast of the Manukau Harbour excluding identified wader bird areas. This is also particularly important given the proximity of the area to major population centres and the increasing demand for access to coastal margins and water recreation opportunities.

District Plan Approach

Adequate setback should be provided to allow for any landward expansion of wetlands in response to sea level rise. As a general rule, further subdivision and development should be precluded in low-lying areas likely to be vulnerable to erosion or inundation within the next 100 years.

Setbacks should also be utilised in order to protect the natural character of the Manukau Harbour coast.

Public access will need to be carefully excluded in the immediate vicinity of ecologically sensitive areas such as the important bird roosts at Karaka Point and Seagrove. It will be important to undertake education and advocacy to encourage appropriate community attitudes and understanding of the coastal environment.

3. The Seabird Coast

The Seabird Coast can be described as that area of coast along the Firth of Thames extending northwards from the Entrance of the Miranda Stream to just south of Waimangu Point.

In southern areas the coast is characterised by a low-lying Chenier Plain (Miranda Chenier Plain), consisting of wave formed shell ridges with intervening lower areas. This is a unique landform in New Zealand and of international importance as a scientific asset - particularly the study of chenier plain development in a tectonically stable progradational coast. The ridges also contain significant information on coastal environmental conditions over the last 3-4000 years.

A similar lowland plain consisting of gravel ridges (known as the Whakatiwai Gravels) is located immediately north. An historic sea cliff fronting old terraces and rolling hill country backs the lowlands. The Whakatiwai gravel ridges are also geologically significant landforms and the combined area is the only known occurrence in the world of a chenier plain/ gravel ridge association.

Sand and shell beaches and the wide intertidal flat of the southern Firth of Thames wetlands front this coastal margin. This area is an extremely important (RAMSAR recognised) wetland and supports extensive populations of migratory waders.

From Kaiaua to Waihihi Bay, the coast is composed of the Whakatiwai gravel plain and adjacent rolling topography. There is a greater concentration of built development in this area, including the settlement of Kaiaua and clusters of houses at Whakatiwai and Waihihi Bay. North of Waihihi Bay, the coast is bordered directly by the lower slopes of the Hunua Ranges and consists of bluffs fronted by narrow gravel beaches.

Natural Character

The chenier plain has been extensively modified by drainage and pastoral land use and to some extent by shell extraction. The coastal margin retains a high level of naturalness, with active chenier ridges, though isolated areas of human built structures (e.g. occasional groynes, an isolated eroding landfill, some shoreline armouring) are evident along the coast. Both environments have the potential to be restored to an ecological area of national significance. Wetland restoration in the low-lying areas of the chenier plain would probably be relatively easy. It is probable that some combined use and restoration would also be practicable -with grazing of elevated ridge areas.

However, the future use of the chenier plain will need to be resolved in discussion with affected landowners. Other relevant management agencies (e.g. Auckland Council, Waikato Regional Council, Hauraki District Council, DoC (Waikato and Auckland regions) and many other parties (iwi, Miranda naturalists, etc) are also relevant. If local landowners are amenable to purchase of the area for ecological restoration in the longer term, then Council may consider raising the issue of the long-term future of the chenier plain at the Hauraki Gulf Forum and/ or initiating discussion with other relevant parties.

The Whakatiwai Gravels to the immediate north are also a geological feature of national significance but have been more extensively modified by coastal development and gravel mining, particularly along the coastal margin. However, it is desirable that a full sequence of the Whakatiwai gravel ridges should also be retained for scientific heritage.

In this area and further north, pockets of development have occurred on the seaward side of the road. Nonetheless the coastal environment retains a moderate to high level of natural character that should be preserved.

Public Access

Public access to and along this coast is generally good and should be maintained and enhanced further as practicable.

District Plan Approach

Any further development to the immediate north of the Whakatiwai Gravels should minimise earthworks to retain other areas of the gravel ridge sequence in as natural condition as practicable.

5.2 Objectives, Policies and Methods

5.2.1 Objective - Ecosystems

To avoid, remedy or mitigate the adverse effects of activities on the life supporting capacity of indigenous ecosystems.

Policies

1. To control the effects of activities where they compromise, directly or indirectly, the life supporting capacity of any indigenous ecosystem including those ecosystems which cross the boundary of Mean High Water Springs.
2. That priority be given to avoiding any adverse effects of land subdivision, use or development on those areas identified in Schedule 5A.

Methods of Implementation of Policies

- Monitoring the effects of Permitted activities and resource consents on ecosystems and, where appropriate, taking enforcement action. (Refer to Part 13 and Part 15).
- Assessing resource consent applications against criteria for ecosystems (refer to Rule 15.6 and Rule 53).
- Informing people how to minimise adverse effects on the functioning of ecosystems.

Reasons and Explanation for Objective, Policies and Methods

Ecosystems are self-regulating communities of plants and animals interacting with one another and with their "non-living" environment (air, water and the like).

Some activities can directly or indirectly compromise the interactions within an ecosystem. Particularly where the activity has an adverse effect on natural resources upon which the ecosystem relies.

The ecosystem may be located some distance from the activity and yet still be affected. For example, if an activity results in the degradation of downstream water quality then some distant ecosystem may be compromised through lack of fresh water. It is always necessary to consider the wider effects of activities.

Anticipated Result

(a) Indigenous flora and flora and significant ecosystems will be protected from the adverse effects of inappropriate subdivision, use and development.

(b) Enhanced biodiversity through the maintenance and enhancement of significant life-supporting ecosystems.

5.2.2 Objective - Bodies of Water

To preserve the features, elements and systems which contribute to and maintain the natural character of the west coast, Firth of Thames and Manukau Harbour coastal environments, and wetlands, lakes and rivers, and their margins, and to ensure that they are protected from inappropriate subdivision, use and development.

Policies

1. **To Avoid, Remedy or Mitigate Adverse Effects on the Following Areas or Features Located within the Coastal Environment:**
    (a) Areas or features identified in Schedules 5A and 5B.
    (b) Areas of indigenous vegetation or habitats of indigenous fauna, which derive their intrinsic character from a coastal location or which contribute to the natural character of the coastal environment.
    (c) Any landform which is a substantial part of the coastal environment.
    (d) Any feature which substantially contributes to the visual quality or amenity value of the coast.
    (e) The identified characteristics of special spiritual, historical or cultural significance to Maaori.
2. **Coastal Environment and Wetlands, Lakes and Rivers, and their Margins:**
    (a) That appropriate vegetation cover, consistent with the natural character and intrinsic values of these areas remains or is reinstated following development.
    (b) To ensure that the effects of subdivision, use or development are not of a scale or nature which is inconsistent with the existing elements of the natural character of the area.
    (c) Protect the natural character and ecological functions of coastal environments, wetlands, lakes and rivers and their margins from cumulative adverse effects.
    (d) To provide for public access where practicable: Public access may not be practicable where it is necessary to: protect areas identified in Schedule 5A
        (i) be consistent with conservation values
        (ii) protect Maaori cultural values
        (iii) protect public health and safety
        (iv) ensure a level of security consistent with the purpose of a resource consent or for other exceptional circumstances.
    (e) Ensure that the recreational use of lakes, rivers and their islands, and wetlands only be allowed where such uses do not adversely affect the particular conservation values of the area or resource."

Note:
Policies in Part 7: Natural Hazards are also relevant.

Methods of Implementation of Policies

1. By identifying the coastal environment as the environment in which the coast is a significant element or part. Key components include:
    (a) Vegetation or habitats adjacent to, or connected with the coastal marine area which derives its intrinsic character from a coastal location or which contributes to the natural character of the coastal environment;
    (b) Any landform adjacent to the Coastal Marine Area which has been or is presently being formed or modified by processes of coastal erosion or deposition;
    (c) Any feature which substantially contributes to the visual quality or amenity value of the coast;
    (d) Areas identified in Schedule 5A;
2. To establish a resource management strategy that defines three Coastal Management Areas with specific objectives and policies to address resource management issues on a more localised level.

[3.-5. Clause 20A deletions]

6. Within the areas adjoining lakes, rivers, streams or wetland defining a setback yard of 30 metres from the edge where:
7. Specific controls on structures are imposed (refer to Part 7 and the relevant zone rules on "development" standards);
8. Assessing resource consent applications in terms of their effect on the natural character of the coastal environment, wetlands, and lakes and rivers and their margins.
9. Checking for compliance with the Waikato Regional Coastal Plan.
10. Requiring resource consent applications for activities that have the potential to visually compromise or prevent public access to the coastal environment or bodies of water (refer to relevant zone activity assessment criteria).
11. Address the effects of active recreation on coastal environments, wetlands, lakes and rivers and their margins through resource consents (refer to relevant zone rules on activities).

Reasons and Explanation for Objective, Policies and Methods

The preservation of the natural character of the coastal environment, wetlands, and lakes and rivers and their margins and the protection of them from inappropriate subdivision, use and development is a matter of national importance under the Act. Maintaining and enhancing public access to them is also a matter of national importance. The District Council is required to recognise and provide for these matters.

Requiring a resource consent application allows the Council to:

1. Refuse consent if the adverse effects of an activity cannot be adequately controlled, or
2. Impose conditions to minimise and control any such adverse effects.

Anticipated Results

(a) The coastline, wetlands, lakes and rivers are not visually compromised or otherwise adversely affected by activities;

(b) Continued public access to bodies of water where this will not compromise conservation values.

5.2.3 Objective - Sustainably Managing Natural Heritage Resources

To sustainably manage the natural heritage resources of the district by:

1. Protecting the following items from inappropriate subdivision, use, and development:
    (a) Outstanding natural features and landscapes;
    (b) Areas of significant indigenous vegetation, and
    (c) Significant habitats of indigenous fauna including trout and salmon;

2. Ensuring that representative samples of natural features, areas of indigenous vegetation, and habitats of indigenous fauna that are of value at a regional and district level are protected.

5.2.3 Policies

1. Adverse effects of land use activities that have the potential to damage or destroy the values of those items listed in Schedules 5A, 5B and 5C shall be avoided.
2. Significant natural features, areas of indigenous vegetation and habitats of indigenous fauna not listed in Schedule 5A which contribute to the rural or natural character of the area should be retained. In the assessment of the significance of such heritage resources the following criteria will be taken into account:

Whether the native bush:

(a) Is of sufficient size and shape to maintain its intrinsic qualities;
(b) Consists of a coherent well-developed canopy of native species;
(c) Consists of a range of native species appropriate to that forest type;
(d) Contains a significant percentage (at least 25 per cent) of mature native trees;
(e) Represents a significant or prominent landscape feature;
(f) May contain native species threatened in the district;
(g) The area has wildlife habitat values, or provides or contributes to a habitat corridor facilitating the movement of wildlife species in the local area.

Whether natural features and habitats of indigenous fauna are:

(a) Of sufficient size and shape to maintain its intrinsic qualities;
(b) The habitat of threatened species (as defined by IUCN criteria);
(c) An area of recognised wildlife or earth science significance;
(d) Freshwater wetland;
(e) An uncommon indigenous vegetation community;
(f) Contribute to the national, regional or district geological heritage.

5.2.3 Methods of Implementation of Policies

Policy 1:

Outstanding natural features are listed in the Schedules to Part 5 (Updated information on Sites of Special Wildlife Interest in the Department of Conservation's Waikato Conservancy is currently unavailable). Outstanding natural features shall include:

1. Sites listed under the RAMSAR Convention (a convention on wetlands of international importance);
2. 'Sites of Special Wildlife Interest' ranked as having outstanding, high, moderate-high or moderate wildlife value;
3. Recommended Areas for Protection under the Protected Natural Areas Programme;
4. Geological sites and landforms listed as being of national importance in the New Zealand Geopreservation Inventory;

Further items be added to Schedule 5A by way of a plan change when sites meet the specified criteria or are from recognised data sources. The specified criteria include:

(a) The extent to which an area is representative or characteristic of the natural diversity in an ecological district or reflects important or representative aspects of New Zealand's geological history;

(b) The presence of a threatened species, or the feature's rarity, or uncommon, special or distinctive features;

(c) The extent to which a natural area can maintain its ecological viability over time;

(d) The extent to which an area is of sufficient size and shape to maintain its intrinsic value;

(e) The relationship a natural feature has with its surrounding landscape, and the extent of buffering or protection from external adverse effects;

(f) The natural diversity of species of flora and fauna, biological communities and ecosystems, geological or edaphic features such as landforms and land processes, parent material, and records of past processes;

(g) The diversity of ecological patterns, such as the change in species composition or communities along environmental gradients;

(h) The extent to which an area is still reflective of its original natural character and quality;

(i) The extent to which an area provides an important habitat for species at different stages of their life cycle;

(j) The importance of an area to tangata whenua.

The items in the Schedules to Part 5 are protected through one of the following methods:

1. Inclusion in a Conservation Zone:
   - Waikato River and associated wetlands and Hunua Ranges
2. A resource consent is required for activities that would modify, damage, or destroy any area or item identified in Schedule 5A including disturbance by earthworks:
   - All other sites
3. In public ownership generally with a reserve status.
4. Sites of importance (such as Pukekohe Hill Special Policy Area) are listed separately in Schedule 5C.

Features and sites identified in Schedule 5A shall be identified in Land Information Memoranda.

Policy 2:

By adopting incentives for the protection of heritage resources including:

1. By allowing the creation of an Environmental Lot where the natural feature is physically and legally protected (refer to Rule 22.11 Environmental Lots);

2. Up to 100% rates remission is provided for under the Local Government (Rating) Act 2002. The Council's current policy provides relief for land comprising natural features that has been appropriately physically and legally protected (or classified) on a voluntary basis, usually unrelated to subdivision.

Other Methods:

That a liaison programme be established whereby individual landowners known to have significant natural features on their property are personally approached and informed of the nature and significance of those features and available methods and incentives for protecting them.

That a range of other low-cost methods be used to inform and educate the community at large including:

1. Community newspapers, newsletters, and public displays of information leaflets.
2. Conservation kits, to be distributed to individual landowners in response to enquiries to the Council, or to local schools and interest groups.
3. Public meetings with groups of landowners and established interest groups, including ratepayer associations.

That a Conservation Information Base be established and maintained, containing information on the type, location, significance, vulnerability, condition and legal protection status of natural features within the District. Data from the Protected Natural Areas Programme, Sites of Special Wildlife Interest and the New Zealand Geological Society's Geopreservation Inventory will form the core of the Conservation Information Base. The information base will be updated on an ongoing basis, with the exchange of information between agencies and results from the monitoring programme.

That a joint monitoring programme be implemented with the Department of Conservation, Regional Councils, Auckland/Waikato Fish and Game Council, Royal Forest and Bird Protection Society and other relevant public agencies and interest groups, to assess, on an ongoing basis, the condition of natural features within the district.

Provisions of the Forest Act 1949 as amended in 1993, prohibits the export and milling of indigenous timber unless a sawmill is registered, and the timber is taken from an area subject to a sustainable forest management plan or permit, or under one of the few exceptions to the Act. The Act does not legislate against the clearance of indigenous forest for conversion to an alternative land use or the use of timber for firewood. The Forests Act is administered by the Ministry for Primary Industries.

5.2.3 Reasons and Explanation for Objective, Policies and Methods

The Council must balance its obligations under the Resource Management Act to protect outstanding natural heritage resources against its experience that a voluntary approach is the most effective long-term method of ensuring protection.

Franklin contains a number of outstanding natural features, the protection of which is a matter of national importance under the Act. The Plan’s approach is therefore to protect through regulation only the outstanding or significant heritage resources and to list these in a schedule contained within the plan (Schedule 5A).

In determining what constitutes an outstanding natural feature, data from the Protected Natural Areas

Programme (where available), Sites of Special Wildlife Interest and the Geopreservation Inventory gives the most 'robust' overview of features within the district. That data indicates the relative significance of the features.

Heritage resources which are not outstanding or significant but contribute to the character of the district are encouraged to be protected by incentives and where appropriate regulation when assessing a resource consent.

A voluntary and proactive approach fosters greater co-operation from landowners who would otherwise be opposed to restrictive controls being imposed on the use of their land in respect of natural features. Landowners should be made aware of the existence and significance of any such features on their property. There need to be tangible incentives to conserve.

The Act requires the district Council to monitor the state of Franklin's natural environment, on an ongoing basis, to determine whether conservation objectives and policies are suitable and are, in practice, effective. This requires a good knowledge of the district's natural features and implies the need for a comprehensive and regularly updated information base.

The Protected Natural Areas Programme seeks to protect areas which most faithfully represent indigenous flora and fauna, distinctive ecosystems and landscape. New Zealand is divided into 268 ecological districts and a Protected Natural Areas survey is intended to be carried out for each of these districts.

All vegetation, wildlife and land forms are surveyed and a comprehensive data base established for each district. Those areas considered most representative of the ecological district, according to a nationally accepted ranking system, are then recommended for protection.

Franklin contains all or part of 6 separate ecological districts - Awhitu, Manukau, Hunua, Raglan, Hauraki and Meremere. Within Franklin, the Hunua, Awhitu and Manukau ecological districts have been surveyed to date.

The former New Zealand Wildlife Service introduced Sites of Special Wildlife Interest as a means of assessing wildlife habitats for the creation of wildlife refuges. Sites of Special Wildlife Interest have been identified throughout Franklin and are ranked in order of significance according to a nationally accepted system (Schedule 5A). Information on flora and fauna, as it relates to habitat, will be held for each site by the district Council.

Information from these sources is in a form that can readily be updated as resurveys and further investigative work are completed.

District Council staff do not have the expertise to identify the significance and vulnerability of many natural features or assess their condition. The Council therefore needs to work in conjunction with agencies that have such expertise.

Information empowers landowners to make informed choices about the future use of their land. Without information many landowners would be unaware of the existence of, or significance of

natural features on their property, let alone opportunities and incentives to protect them.

5.2.3 Anticipated Results

1. Outstanding natural features are protected with certainty;
2. A representative sample of natural heritage resources is protected;
3. A willingness by landowners to achieve conservation objectives in partnership with the district Council and wider community;
4. A greater public awareness of the type, location, significance and vulnerability of natural features, available methods of protection, and general conservation issues facing the district.

Schedule 5A: Conservation of Outstanding Natural Features

(For each feature the adverse effects and type of protection afforded are listed.)

SITES OF SPECIAL WILDLIFE INTEREST

(Note: These sites/areas are identified on the planning maps).

Outstanding Wildlife Value:

1 Intentionally blank

2 Hunua Ranges *(in the ownership of the Auckland Council and including the Hunua Falls Scenic Reserve in Council's ownership)*
Type of Protection
District Plan:
• District Plan conservation zoning (Forest Conservation Zone) and is a Regional Reserve.
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

3 Intentionally blank

4 Whangamarino Wetland *(Map 8)*
Type of Protection
• District Plan conservation zoning (Wetland Conservation Zone)
Adverse Effects

- Drainage, reclamation of the swamp
- Vegetation clearance
- Modification of hydrological regimes
- Loss of threatened species
- Weed invasion
- Siltation

5 Waikato River and Wetlands *(Maps 5 to 8, 11, 13)*
Type of Protection
• This area is protected by a District Plan conservation zoning (Wetland Conservation Zone).
Adverse Effects
• Vegetation clearance • Loss of threatened species • Weed invasion • Reclamation, siltation • Degradation in water quality • Modification damage or destruction of wildlife habitats

High Wildlife Value:

6 Mangatawhiri Swamp *State Highway 1 (Maps 7 and 8)*
Type of Protection
• District Plan conservation zoning (Wetland Conservation Zone) as well as a small portion being protected by a Council covenant
Adverse Effects
• Drainage reclamation of the swamp • Vegetation clearance • Modification of hydrological regimes • Loss of threatened species • Weed invasion • Siltation

Moderate - High Wildlife Value:

7, 8 Intentionally blank

9 Motions Road Wetland *(Map 5)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Drainage reclamation of the swamp • Vegetation clearance • Modification of hydrological regimes • Loss of threatened species • Weed invasion • Siltation

10 Allcock Road Bush *(Maps 5 and 6)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

Moderate Wildlife Value

11 - 17 Intentionally blank

18 Lake Rotoiti *Karioitahi Road (Map 5)*
Type of Protection
District Plan:
• Activity Lists • General Performance Standards 23.6.3 Development Setbacks 23.6.5 Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Reduction in water quality • Vegetation clearance • Weed invasion • Reclamation

19 Lake Puketi *Karioitahi Road (Map 5)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Reduction in water quality • Vegetation clearance • Weed invasion • Reclamation

20 Otaua Bush *Maioro Road (Maps 5 and 5.1)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

21 Lake Otamatearoa *Whiriwhiri Road (Map 5)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Reduction in water quality • Vegetation clearance • Weed invasion • Reclamation

22 - 25 Intentionally blank

26 Bald Hill Bush *Bald Hill Road (Map 6)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

27 - 28 Intentionally blank

29 Alexandra Redoubt Bush *Alexandra Redoubt Road (Map 7)*
Type of Protection
Reserve Status and area of bush on private land protected by Council Covenant.
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Part 34 Recreation Zone - Performance Standards • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

30 - 32 Intentionally blank

33 Pouraureroa Stream Bush *SH2 (Maps 2 and 8)*
Type of Protection
Some of the bush is protected by Council Covenant. The rest is subject to:
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

34 Mt William Walkway *McMillan Road (Maps 2 and 8)*
Type of Protection
Some of the bush is protected by Council covenants and some partly DOC Scenic Reserves. The rest is subject to:
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

36 Shipherds Scenic Reserve *Aka Aka Road (Map 6)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Outstanding Natural Features • Part 34 Recreation Zone - Performance Standards • Assessment criteria for resource consents
Adverse Effects
• Modification, damage or destruction of the native bush and wildlife habitats • Vegetation clearance and fragmentation • Reduction in bush quality and naturalness through pests and weeds • Reduction in regeneration ability through stock grazing, weed invasion, browsing of wild animals • Loss of threatened species

37 Intentionally blank

38 Aka Aka Wetland *Masters Road (Map 5)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Drainage and reclamation of the wetland • Vegetation clearance • Modification of hydrological regimes • Loss of threatened species • Weed invasion • Siltation • Stock damage - grazing and trampling of wetland vegetation

39 - 40 Intentionally blank

41 Lyons Road Wetland *(Map 2)*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Drainage and reclamation of the wetland • Vegetation clearance • Modification of hydrological regimes • Loss of threatened species • Weed invasion • Siltation • Stock damage - grazing and trampling of wetland vegetation

Schedule 5B: Important Geological Sites and Landforms listed in the New Zealand Geopreservation Inventory

(Note: These sites/areas are not identified on the planning maps).

1 Intentionally blank

National Importance

2 Daff Road Jurassic Plant Beds *In farm quarry, 200 metres north of Putataha tuff ring and 400 metres south of farm airstrip, 2 km south of end of Daff Road*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks

3 Kaawa Creek - Ngatatura Bay Section *In coastal cliffs for 1 kilometre south of Kaawa Creek mouth*
Type of Protection
District Plan:
• Activity Lists • Parts 23A and 23B Performance and Development Standards – Rural and Coastal Zones - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks • Natural and human induced erosion and uncontrolled vegetation growth

4 Kellyville Tuff Ring *East of North Island Main Trunk Railway at Mercer village*
Type of Protection
District Plan:
• Activity Lists • Parts 23A and 23C Performance and Development Standards – Rural and Village Zones - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, rail/roadworks and earthworks

5 Moeweka Quarry Jurassic Fauna *Quarry just north of Ponganui Road, Wairamarama*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Adverse Effects • Mining/extraction • Deposition, reclamation, roadworks and earthworks

6 Onewhero Tuff Ring *Bounds Kaipo Flats approximately 1-2 kilometres north-west of Onewhero village*
Type of Protection
District Plan:
• Activity Lists • Parts 23A and 23C Performance and Development Standards – Rural and Village Zones - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks • Modification of geomorphic integrity of ring

7 Opuatia Cliff Jurassic Fauna *North of Ponganui Road, on Opuatia Stream, Wairamarama*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks

8 Port Waikato to Tuakau Bridge Road Jurassic Section *South side of Waikato River, section alongside Port Waikato-Tuakau Bridge Road between points 0.5 kilometres east of Daff Road and 2 kilometres west of Daff Road*
Type of Protection
District Plan:
• Activity Lists • Part 23A Performance and Development Standards – Rural Zone - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks

9 Pukekawa III Scoria Cone *Adjacent and to the west of Highway 22 just north-west of Pukekawa village*
Type of Protection
District Plan:
• Activity Lists • Parts 23A and 23C Performance and Development Standards – Rural and Village Zones - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Adverse Effects • Mining/extraction • Deposition, reclamation, roadworks and earthworks • Loss of form and integrity of feature

10 - 12 Intentionally blank

13 Huriwai Beach Jurassic Plant Beds
Type of Protection
District Plan:
• Activity Lists • Parts 23A and 23B Performance and Development Standards – Rural and Coastal Zones - Development Setback - Outstanding Natural Features • Assessment criteria for resource consents
Adverse Effects
• Mining/extraction • Deposition, reclamation, roadworks and earthworks

Schedule 5C: Other Important Sites

(Note: These areas are not identified on the planning maps).

1, 2 Intentionally blank

3 Waikato River Delta
Type of Protection
This area is protected by a Wetland Conservation Zone.
Adverse Effects
• Loss of natural estuarine and river mouth processes through changes to river hydrology and dynamic stability.