
4.0 Future Development

4.1 Future Development

The Puhoi to Pakiri Greenways Plan will be implemented over time to achieve (in part) the outcomes envisaged in the Local Board Plan. Implementation of this plan will include the upgrade of existing walking, cycling and bridle connections (both on and off-road), as well as the creation of new connections within open space land, through designation areas, and/or via partnerships with non-council parties.

Successful implementation of the plan requires co-ordination and commitment from the Rodney Local Board, Auckland Council and Auckland Transport in collaboration with Mana Whenua, as well as relevant public agencies such as the Department of Conservation, NZTA, Northpower, Watercare Services Ltd, Transpower and Vector. Assistance from community groups, local businesses or schools would also greatly improve delivery of the network.

The following section gives an overview of the future development and implementation of the Rodney Greenways Plans in the short-medium term, including best practice for implementation, stakeholder involvement and funding availability, related case studies and the prioritisation strategy.

4.2 Best Practice for Implementation

As individual projects for delivery get underway based on this plan, their design shall take into consideration all known 'best practice' guidelines, which include:

- Local Paths Design Guide (Auckland Council)
- Auckland Transport Code of Practice
- Stormwater Code of Practice (Healthy Waters)
- Parkland Design Guidelines (Community and Cultural Policy, Draft)
- Te Aranga Principles (Auckland Design Manual)

Related 'best practice' documents such as NZTA's 'Bridging the Gap – Urban Design Guidelines', DoC's 'Caring for Archaeological Sites' report, and the Ministry of Justice's 'National Guidelines for Crime Prevention through Environmental Design (CPTED) in New Zealand' shall also be taken into account as designs develop, in addition to all relevant Unitary Plan controls and area-specific policies.

4.3 Stakeholder Funding and Information

Ongoing community engagement, stakeholder collaboration and partnerships are key to the successful implementation of the Rodney Greenways.

Likely stakeholders, other than those previously mentioned include:

- Neighbouring Local Boards
- Auckland Tourism, Events and Economic Development (ATEED)
- Cycle Action Auckland
- YES Disability
- Operators of community facilities, including schools
- Ministry of Education
- Department of Conservation
- Housing New Zealand
- Ministry of Defence
- Local residents, community groups and business associations
- Forest and Bird

Grass-roots community involvement in particular is very important to ensure the ongoing success of the Greenways plan. Local knowledge-sharing and volunteering are needed to provide community ownership, care and responsibility. Community involvement could take the form of planting/weed clearance days, 'adopt a stream/street' groups, fundraising, lobbying and artistic input.

Funding has been allocated for roading improvements in the Local Board area in Auckland Council's Long Term Plan (LTP) for the next 10 years, and some of this will be used to implement the Greenways. Other funding avenues include Auckland Transport and the NZTA's regional cycleways fund. In addition the Local Board has planned open space projects to assist with implementation of the priority sections of this Plan.

The maps contained in Appendix - Section C, break down the prioritised projects in more detail, to setup for future planning and programming.

4.4 Working with Mana Whenua - Treaty Partners

The Rodney Local Board will continue to work with Mana Whenua to implement the Puhoi to Pakiri Greenways Plan, with the guidance of the Te Aranga Principles, these are:

1. **Rangatiranga:** The right to exercise authority and self determination within ones own iwi / hapū realm
2. **Kaitiakitanga:** managing and conserving the environment as part of a reciprocal relationship, based on the Māori world view that we as humans are part of the natural world
3. **Manaakitanga:** the ethic of holistic hospitality whereby mana whenua have inherited obligations to be the best hosts they can be
4. **Wairuatanga:** the immutable spiritual connection between people and their environments
5. **Kotahitanga:** unity, cohesion and collaboration
6. **Whanaungatanga:** a relationship through shared experiences and working together which provides people with a sense of belonging
7. **Mātauranga:** Māori / mana whenua knowledge and understanding.

It is understood that these principles are for initial guidance only and in no way replace the need for individual Mana Whenua consultation on every project.

In support of the above principles, there is opportunity to share narratives wherever the Greenways routes follow historic trails, for Mana Whenua to share narrative and explore creative expression.

Improving freshwater quality, restoring the health of the natural environment and avoidance of wāhi tapu sites and toanga is a baseline objective of the Rodney Greenways and this aligns closely with the 'world view' of the Te Aranga Principles.

The process of developing this plan from aspirational to planning and design to physical implementation requires the support of Mana Whenua, through working relationships and strengthened regular engagement, including liaison through the Mana Whenua Northern Iwi Forum, local iwi representatives and marae. Resourcing of iwi engagement will be achieved through the setting of work programme budgets and delivered through Auckland Council's project framework.



Outskirts of Matakana Village

References

Image reference

Cover Page	Auckland Council Stock Photo (2014). <i>Aerial photo of Pakiri.</i>
Page 3	Auckland Council Stock Photo (2013). <i>Puhoi Town Library.</i>
Page 4	Auckland Council Stock Photo (2014). <i>Mahurangi West Regional Park.</i>
Page 7	Adapted from Rodney Local Board Plan (2014). <i>Plan objectives.</i>
Page 8	Auckland Council Design Team (2016). <i>Overall Greenways Network, Auckland.</i>
Page 9	Auckland Council Stock Photos. <i>Connections in open spaces Connections in streets and transport corridors. Streams and ecological areas.</i>
Page 10/11	Greenways Design Guide (2016). <i>Positioning Greenways in Auckland's Walking and Cycling Network.</i>
Page 12	Auckland Council Stock Photo (2012). <i>Wenderholm Regional Park.</i>
Page 13	Auckland Council Design Team (2016). <i>Auckland Isthmus.</i>
Page 14	Auckland Council Stock Photo (2016). <i>Matakana Village cycleway bridge.</i>
Page 16	Photographer: Esther Hjelmström (2016). <i>Targeted Consultation workshop, Rodney Local Board.</i>
Page 18	Auckland Council Stock Photo (2014). <i>Tawharanui Regional Park.</i>
Page 36	Auckland Council Stock Photo (2013). <i>Outskirts of Matakana Village</i>
Page 39	Auckland Council Stock Photo (2014). <i>Ko nga manu te Mahurangi - Birds of the Mahurangi.</i>
Page 41	Auckland Council Stock Photo (2013). <i>Snells Beach Reserve.</i>
Page 89	Auckland Council Stock Photo (2013). <i>Snells Beach Reserve.</i>
Back Cover	Auckland Council Stock Photo (2012). <i>Wenderholm Regional Park.</i>

Text reference

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Appendices



Snells Beach Reserve, Warkworth

A. Analysis Mapping



Auckland context

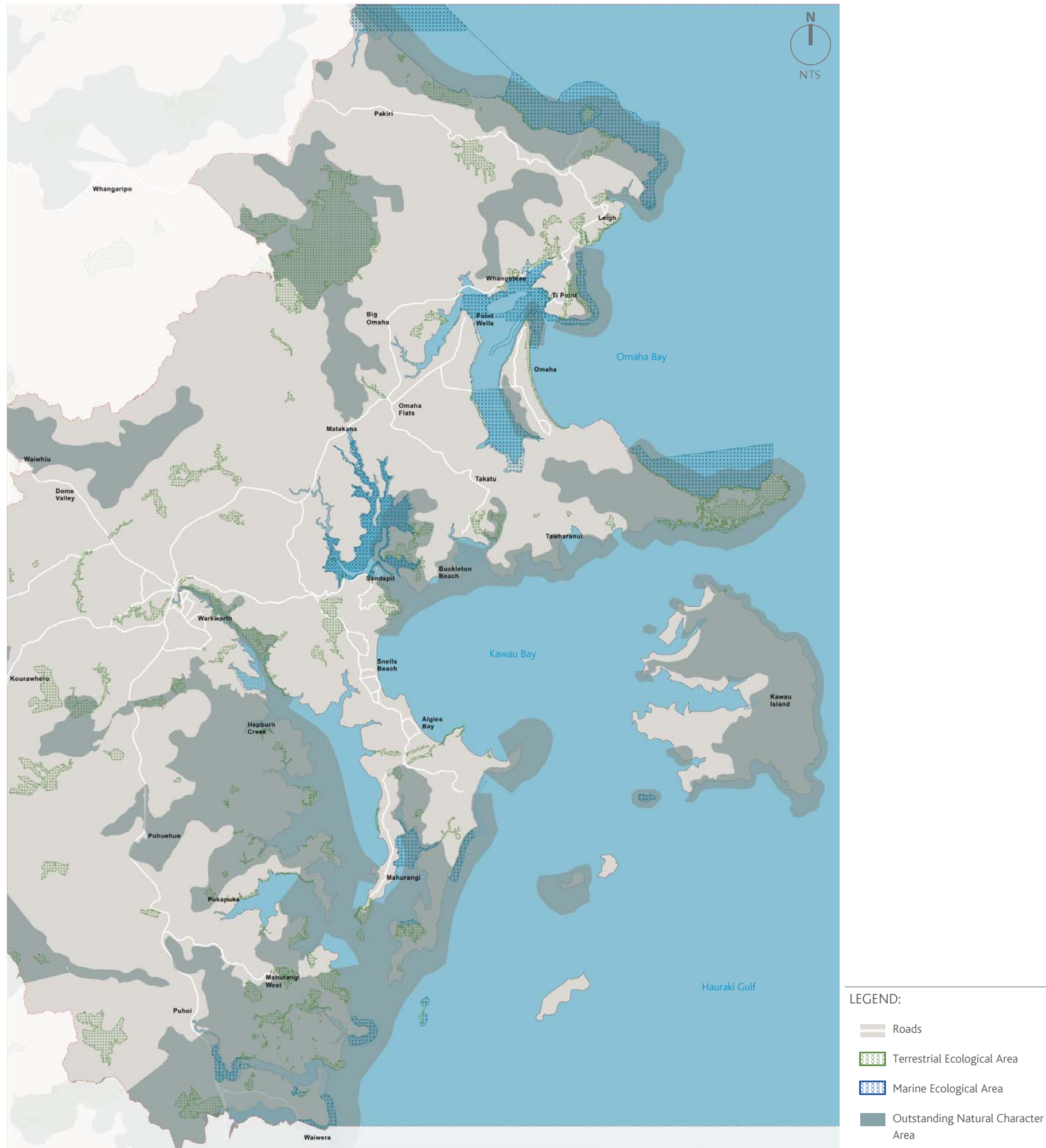
This map shows the study area within its context of the Rodney Local Board Area, and the wider Auckland region. The Rodney Local Board is by far the largest Local Board area within the Auckland region, and for this reason, its greenways plans are split into smaller areas - mapping the entire area at once would be extremely unwieldy, and the data presented would be at an unreadably small scale.

The Puhoi to Pakiri network area hosts (or provides access to) many regionally significant recreational amenities, including four regional parks (Mahurangi, Scandrett, Tawharanui and Pakiri), a number of popular Auckland beaches, and the Dome Forest walking and biking tracks.

At this scale, there are several items of particular interest to be considered in the creation of the greenways network:

- The Te Araroa national trail traverses the length of the study area
- The area is served by road connections, but lacks in public transport options (minimal bus routes and no rail line).
- The study area is large - as large as many urban local board areas

A more detailed analysis of the underlying factors that have shaped and influenced this Greenways Plan is explained in this section.



Ecology and Landscape

Much of the ecological significance in the study area relates to its vast coastal environment. The Auckland Regional Policy Statement (ARPS) lists the species that are known to frequent this general area of the Hauraki Gulf and these including the white faced heron, blue reef heron, banded rail and pied stilt. New Zealand dotterel and variable oystercatcher also breed in the area. In order to maintain the wader population, preservation of roosting areas is of great importance. If public land access is provided to any of these areas, it should be planned so as to least disturb these features. Protection of the intertidal sand and mud banks is also essential for birdlife in the harbour.

More specifically: within the Wenderholm area there is a considerable variety of intertidal habitats supporting plant and animal communities. The beach also adjoins an important section of coastal taraire forest along the headland.

Intertidal flats within the Puhoi estuary are used as a feeding ground by wading birds, and many other species use the estuary to roost and as a stepping stone in their travels. The Mahurangi Harbour is a regionally important centre for oyster farming, and the upper reaches of the harbour are bordered by remnants of kahikatea swamp forest.

There are also several significant terrestrial ecological areas within the study area, the largest being the Omaha Ecological Area which is considered to be of national importance. The steep, elevated area is covered in broadleaf, podocarp forest with young kauri, and gullies consist of dense taraire, kohekohe and towai stands. The Dome Forest stewardship area is another of significance - comprised of 400 hectares of regenerating native forest and significant fauna habitats. Both areas are administered by DoC.

Moving to landscape values, a large portion of the study area is considered to have outstanding natural character. This means these areas are highly valued for their natural scenic qualities, and natural features/values are predominant over human modification to the landscape. Under the Unitary Plan, more restrictive rules apply to the potential development and use of these areas.

The presence of such rich fauna, flora and landscape values brings with it specific development constraints, but adds greatly to the interest and education potential of any Greenways routes. Greenways projects carry with them a revegetation component, which can expand on and strengthen these important ecological areas.



Key Open Spaces

This map shows all land zoned open space within the Auckland Unitary Plan, and is an important resource as greenways typically aim to link areas of open space together.

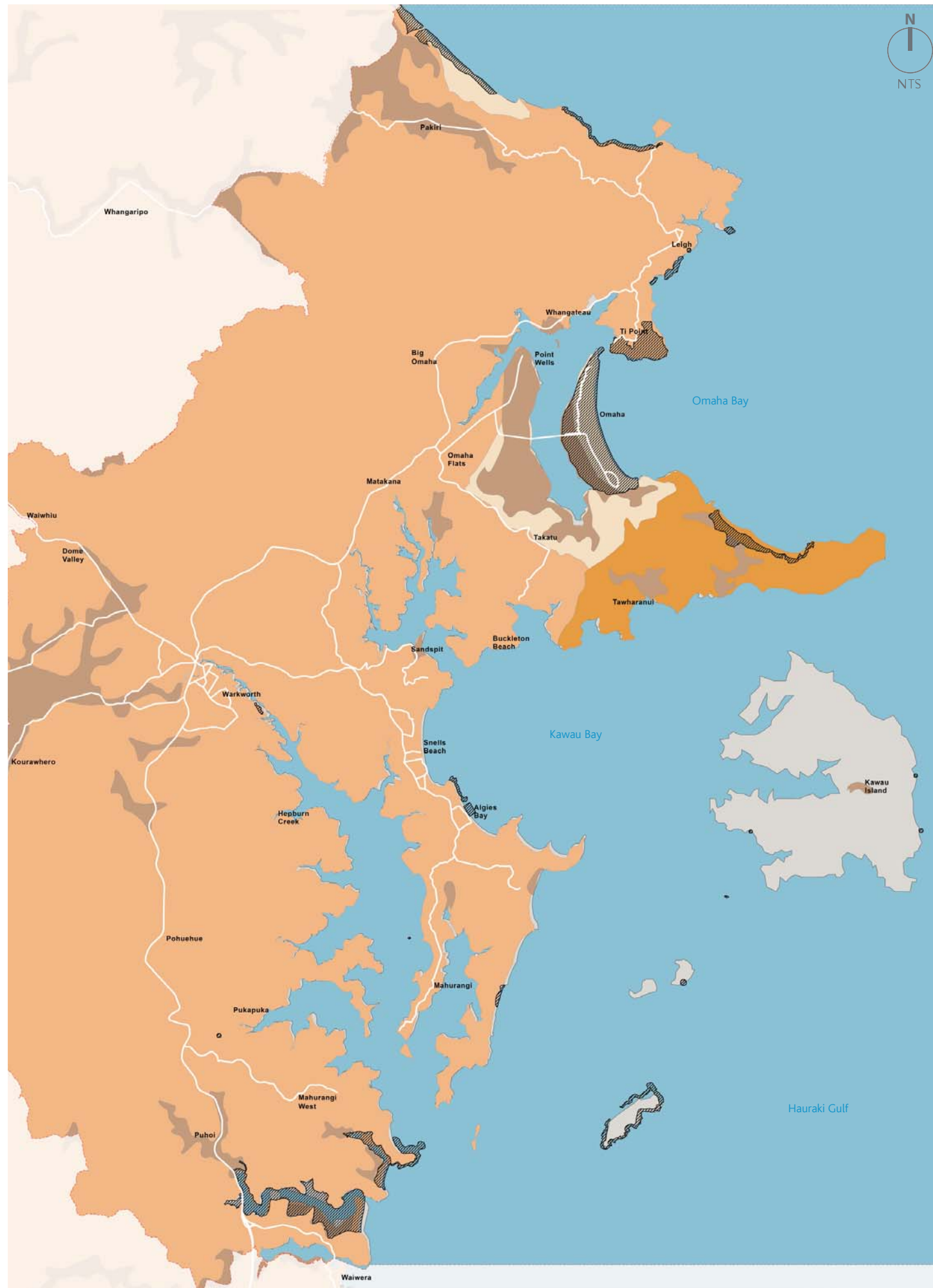
Based on land area alone, there is a relatively low proportion of open space, although taking into account the low population density and rural character of this area, provision starts to balance out. Most of the townships are served by local parks, and many also feature stream corridor reserves as well. In addition to this, the study area is home to 5 of Auckland's 34 regional parks which host a variety of walking tracks, as well as the very popular route through Dome Valley/Forest.

The low density of open space shown on the map presents challenges in developing a greenways plan, as it means there is a much greater emphasis on road connections, or on negotiating easements/access arrangements with developers or landowners. Where any routes are shown across non-council owned land, these are indicative only, and simply signal an interest that may be further discussed by Council if property discussions come up.

It is worth noting that open space will be provided over time as residential development occurs, and that the greenways plan offers an ability to inform each standalone development of the regional context that their open space provision could connect into.

LEGEND:

- Parks and Reserve Land
- Roads



Geology

While the underlying geomorphology of the Auckland region is heavily influenced by its volcanic history, in this area the soils are generally from more sedimentary or alluvial origins, with significant geological sites sitting primarily on coastal fringes.

In sedimentary terms, the 'Waitematā Basin' is the underlying process at play here. The Waitematā Basin formed quite rapidly between 24 and 18 million years ago, and extended from the North Waikato to Whangarei. This underwater landform collected sand and mud from eroding landforms including the Manukau volcanoes, and the giant Waitakere Volcano further west. This sediment was dominated by silts and muddy sands with some coarser grained sediments.

As the basin sunk, the sediments were buried to greater depths. The basin is thought to have subsided to depths of between 1 and 3 kilometres. The sediments infilling the basin were compressed, consolidated and in places cemented to form a thick sequence of inter-bedded weak siltstone and muddy sandstones. Between 15-17 million years ago, this area was uplifted via tectonic activity, and this geological sequence is now collectively referred to as the Waitematā Group. Residual soils of the Waitematā Group are made up of mudstone and sandstone, and while relatively fertile, are also soft and readily eroded.

The low-lying alluvial soils around Puhoi, Point Wells and Pakiri have likely been formed via stream erosion/deposition processes more recently. Alluvial soils are found in the areas where stream gradients flatten off, allowing the sediment load in the water to drop out. These soils are a mix of mud, sand and gravel (often with organic matter) and provide the most fertile areas found locally. These would have typically been colonised by Kahikatea and other broadleaf species. There are also likely to be some pockets of muddy substrate at coastal inlets and around waterways.

Tawharanui Peninsula, the eastern-most area of Rodney is made up of greywacke and limestone soils, which is displayed by the largely exposed, rocky coastal environment and intertidal reefs.

A significant geological site to note is the low-lying Omaha Sandspit (comprised of beach sediment), which is highly sensitive to tidal processes and thus efforts to stabilise the area with artificial groynes and dune planting have occurred to reduce erosion of the spit.



Hydrology and Catchments





This map shows the water catchments, sub-catchments and the 100 year flood plains, as well as permanent local watercourses. Compared with much of the Auckland region, the stream profiles within the study area are in a relatively unmodified state, although a number of the smaller/ephemeral watercourses have been straightened for agricultural purposes.

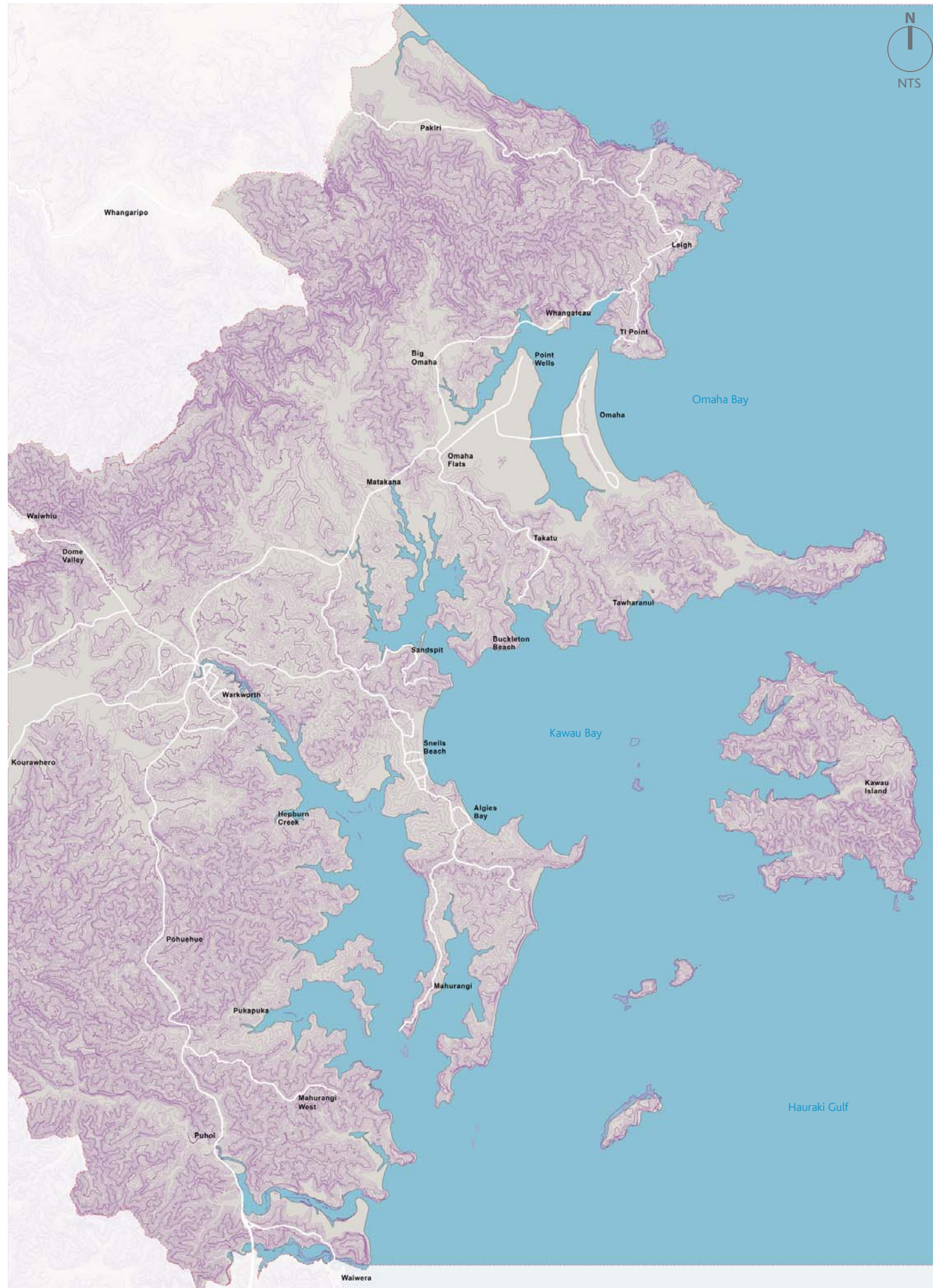
However, streams within agricultural areas often suffer high levels of nitrates and other pollutants, as a result of fertiliser, pesticide and herbicide runoff from surrounding farms. These then flow out to sea and affect the overall water quality. Landcover in Warkworth is 51.3% pastoral vegetation, and the Mahurangi Harbour alone receives runoff from a 122km² catchment.

The 2016 State of the Environment Report Card marks the marine and freshwater health of the study area as a B (a 'good' ranking with a moderately healthy ecology). The Rodney Local Board is committed to protecting and restoring both the riparian and coastal environment. It is noted in the 2014 Local Board that planting stream banks and fencing off waterways helps reduce the sediment going into our waterways, and implementation of the greenways plan can help achieve this.

As this area develops residentially, scrutiny will also go on sustainable water treatment practices, to ensure that flooding and water quality issues are not created as impervious surfacing increases. There may also be flood mitigation projects proposed by Council. Such projects, typically supported by native planting and walking/cycling and recreational facilities have the potential to form/drive the greenways network in this area as development proceeds.

LEGEND:

-  Roads
-  Floodplains
-  Catchments
-  Streams/Rivers






Topography

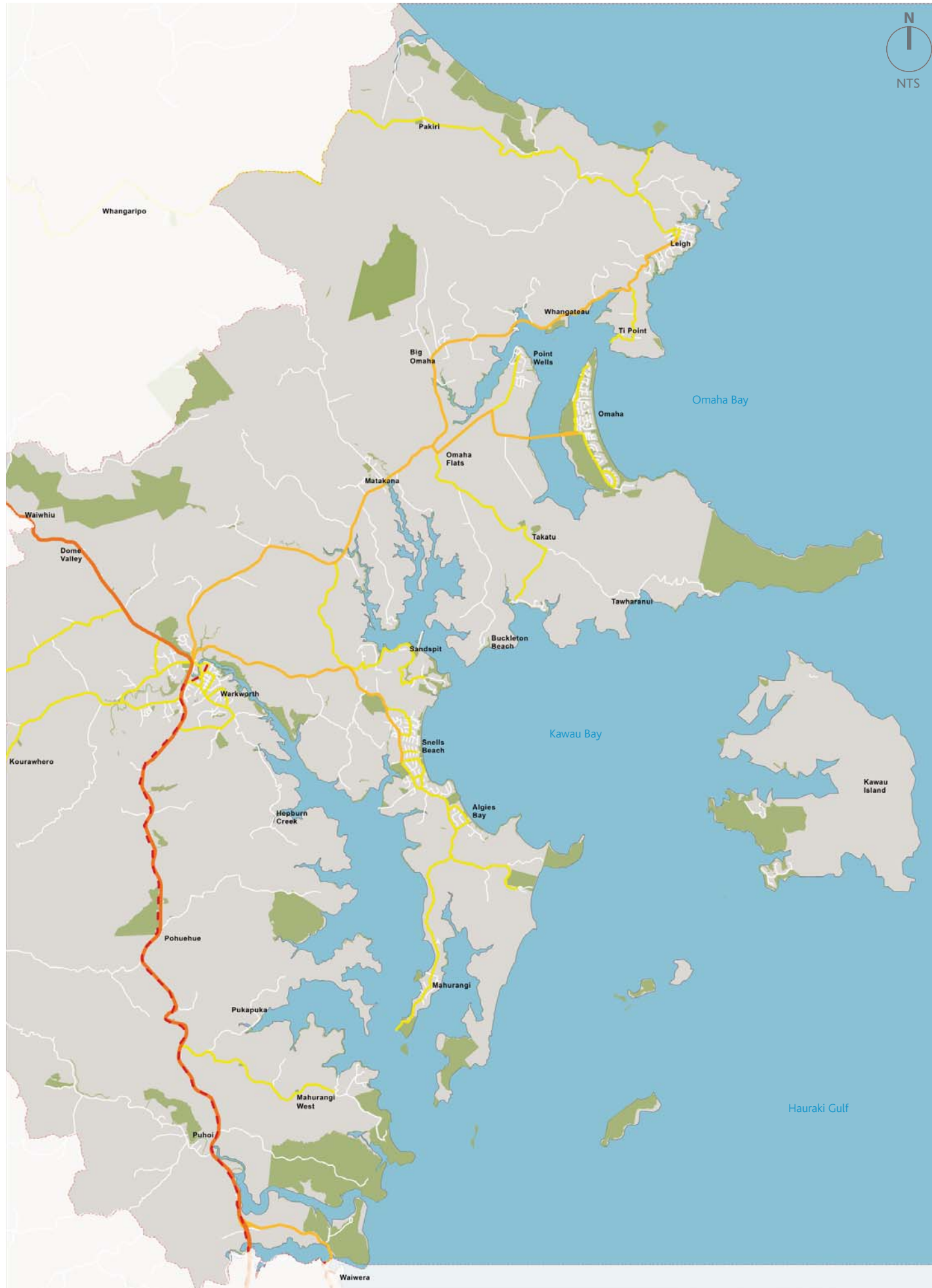
The study area takes in a vast length of coastline and native forest, and surface terrain is a combination of steep ridge lines, with lower local elevations within gullies and at coastal fringes. The larger townships and majority of the coastal settlements are located on flatter terrain.

From a Greenways' perspective a flat contour is favourable, as it allows for a range of route options, avoiding busy roads; and is suitable for a wider range of ages and physical abilities. However due to the nature of this area, greenways routes will more than likely encounter a range of contours, and consideration of how to minimise vertical climb and orientation of cross slopes will be required.

In terms of the proposed greenway routes, further investigation is required at a detailed stage to determine the feasibility of providing 'all ability' cycle access in the steeper sections of the study area. There may be walking-only tracks provided where cycling is not possible due to slope.

LEGEND:

-  Roads
-  50m contours
-  10m contours



LEGEND:

- Park and Reserve land
- SH1
- Major & Arterial Roads
- Medium Roads
- Minor Roads
- Bus Route

Road Hierarchy

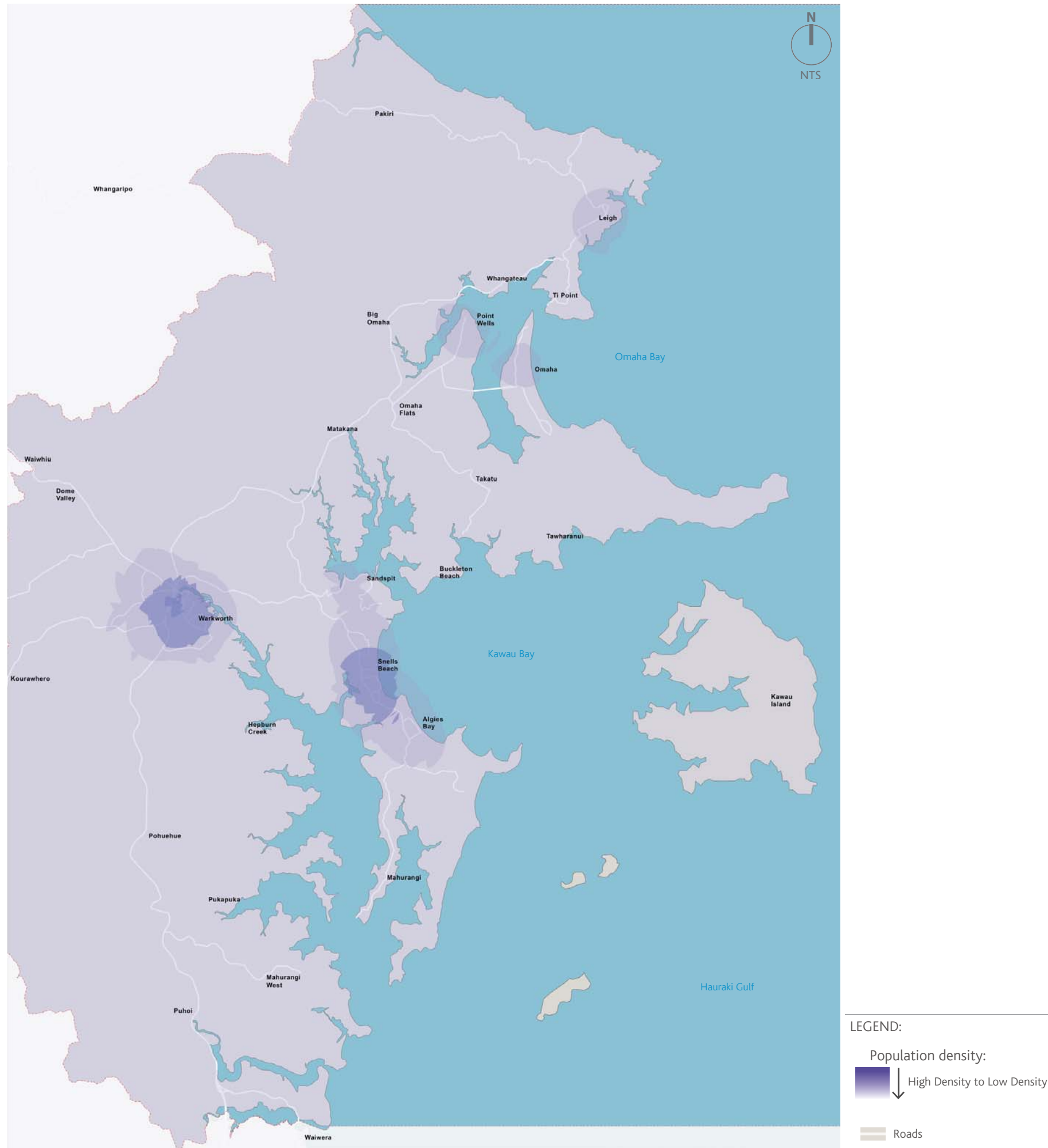
Existing road hierarchy has been considered when determining the Greenways routes, in order to create safe, desirable and high-amenity environments, encouraging use by as many Aucklanders as possible.

Major, medium and arterial roads are typically busy roads that provide for a range of transport types, including cars, buses and trucks. Careful consideration needs to be taken where the green links network intersects or runs along these roads, to ensure desirable/ safe routes are formed, and Greenways generally avoid these routes.

Minor or local roads are slower speed environments with lower traffic flows and typically provide more desirable Greenway connections. While these tend to be prioritised when planning Greenway routes, careful consideration at the design stage will still be required in order to ensure adequate passive surveillance and motorist awareness of pedestrians, cyclists and recreational users.

The road hierarchy also affects potential for street 'greening' initiatives, such as narrowing traffic lanes, providing vegetated chicanes and shared spaces, and treating stormwater on site. Methods for providing safe crossing points will also be affected by the road hierarchy - for instance, un-signalised crossings are unlikely to be permitted on arterial roads.

One particular issue for the study area is the conversion of high speed rural roads into those serving as collectors for developing residential areas. Significant safety improvements will be required to lower speeds, due to the straight and flat nature of these roads, and this is the opportunity to 'bake in' some of the greenways network, where the routes overlap.

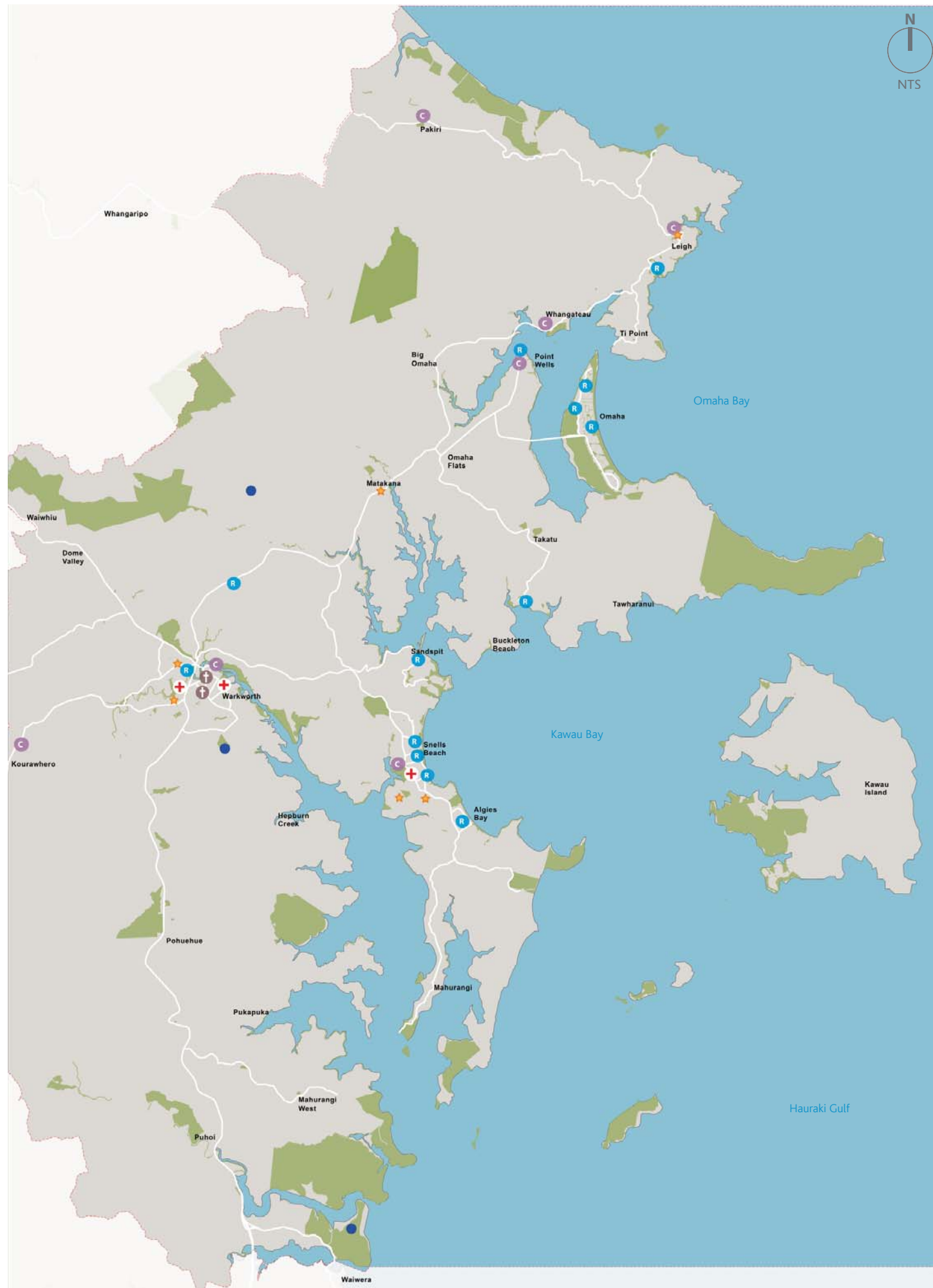


Population Density

This heat chart map, sourced from the Auckland Plan (2012) shows population densities based on Census meshblock data. Population density is important in Greenways planning as it shows where potential users will be coming from, and it is logical to focus efforts in these areas (in addition to providing strategic regional connections, which are not as influenced by proximity to housing).

The overall density in this area is at the lighter end of the spectrum within the Auckland region, reflecting the traditionally rural nature of Rodney's southeastern coast. Although density is forecast to change in the coming years, the map shows that the study area is currently comprised of two main residential areas - Warkworth and Snells Beach; with subsidiary areas including Omaha, Point Wells and Leigh. Outside of these townships, clusterings of population are more sporadic. In terms of greenways, the sparse population density poses some challenges in terms of making connections through areas of low population, and the inherent safety challenges in this. On the other hand however, when planned properly these connections can be some of the most scenic and popular routes, and can draw significant numbers of people to an area.

In general, as a city intensifies, residential section sizes become smaller, and residents require recreation facilities beyond their backyard. While this can be perceived as a negative impact of intensification, if well planned, these public open spaces can actually build communities by providing locations and facilities where people from different communities can come together and meet.



Social Infrastructure

This map shows community facilities in the study area, including community centres and halls, places of worship, and recreation facilities. Other community facilities sometimes noted here are historic monuments/museums.

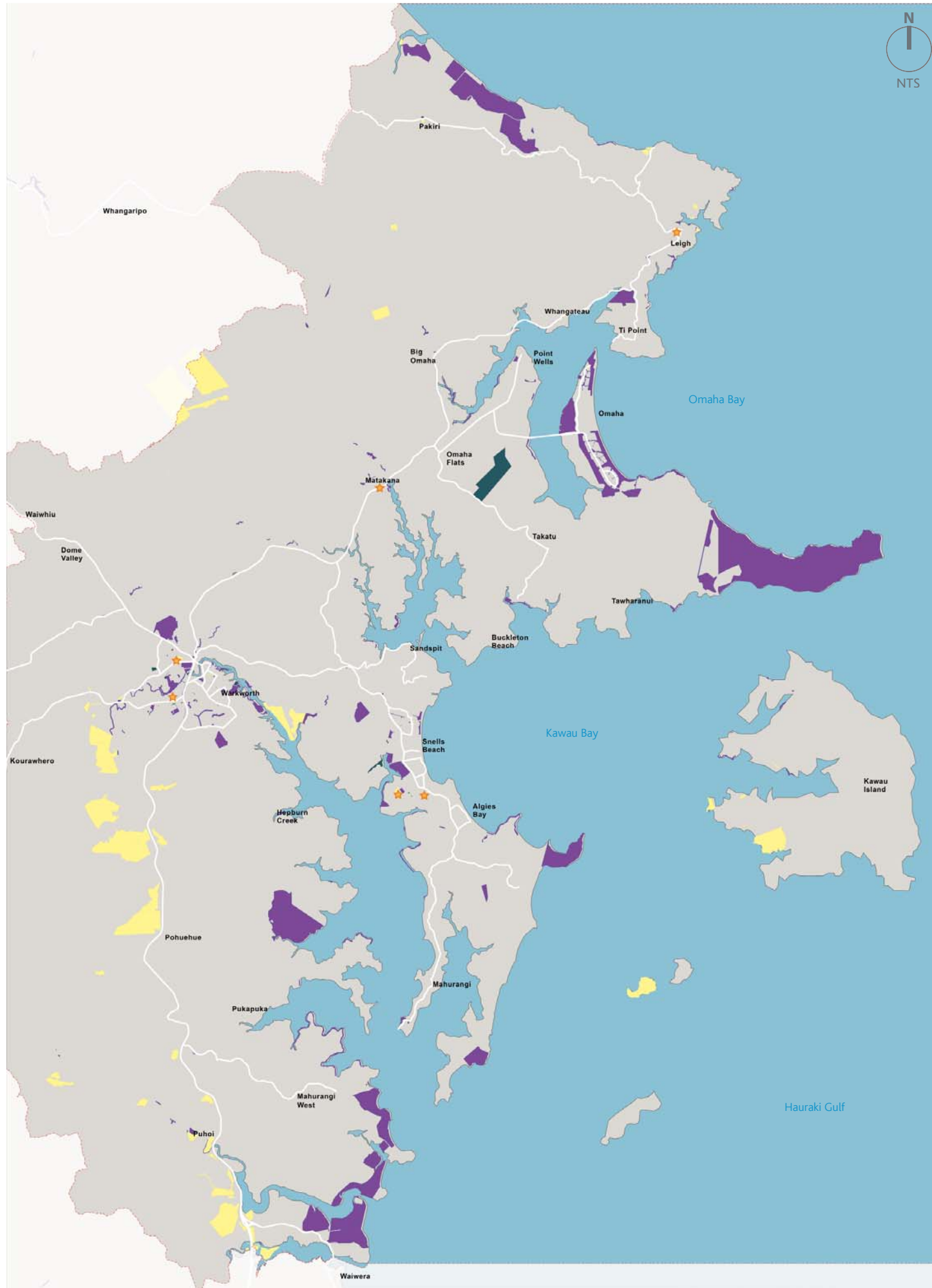
Schools and other community facilities are critical points in the Greenways plan, providing both an opportunity to create connections via easements, while also providing destinations in their own right. These facilities are visited on a frequent basis, and providing safer, higher amenity and more accessible connections has great potential to reduce reliance on private vehicles.

Access to schools is of particular benefit, as it encourages parents to let children travel actively to school, improving fitness, gaining an appreciation of the natural environment, and locking in good habits for later life. Proposed connections to schools may be influenced by existing 'walking school bus' routes. Auckland Transport makes funding available for walking school bus routes, and it is possible that some connections could be supplemented by this funding stream.

Any easement proposal within the boundaries of a community facility would need to be firstly consulted with the landowner or leaseholder, and needs to be carefully considered to ensure the safety of students/facility users, and minimise risk of property damage. Some accesses may need to be limited to certain times of day for these reasons.

LEGEND:

- Park and Reserve land
- Roads
- ★ Schools
- Ⓡ Recreation Facilities
- ⊕ Places of Worship
- ⊕ Medical Facilities
- Ⓢ Communities Centres & Halls
- Monuments/Museum



Land Ownership

This map shows land within the study area that is in some form public or community ownership. This information is important, as connections on publicly-owned land are more readily achieved than those on privately-owned property.

Publicly-owned land within the study area features two main types of ownership:






Auckland Council: This land may be available for greenway connections, dependent on the current or proposed usage of the site.

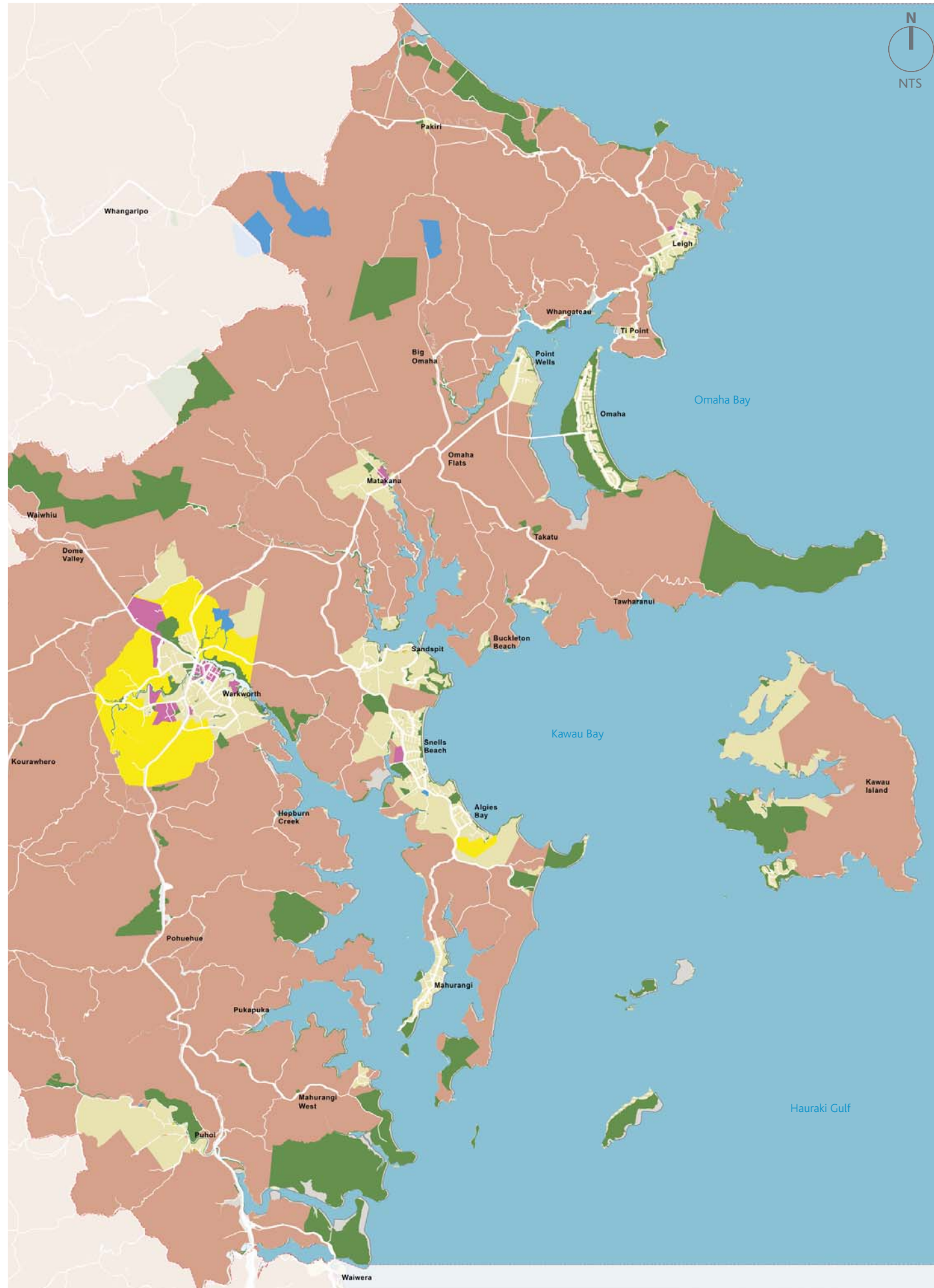
Council Controlled Organisations include Watercare Services Ltd, Auckland Transport, Panuku (Development Auckland), Regional Facilities Auckland and Auckland Tourism, Events and Economic Development (ATEED).

Crown: This land is owned by the Crown and may include commercial forests, leased pastoral land, conservation land (administered by DoC) and marine and coastal areas.

Schools: The map shows the most important locations of primary and secondary education. The most significant institution is Mahurangi College in Warkworth, as teachers and students commute from beach communities to the school every weekday.

LEGEND:

-  Roads
-  Auckland Council
-  Crown
-  Watercare
-  Schools



Unitary Plan

This map shows Auckland Council Unitary Plan zoning, which became operative in 2016. Zoning in the study area can be summarised as:

Business Zone: Relates to commercial and industrial activities, including retailing, servicing, offices, warehousing, manufacturing and research. orientated activities.

Residential Zone: Relates to areas that are predominately but not exclusively used for residential activity.

Open Space Zone: Relates to a range of open space used for recreation activities, and conservation and visual purposes, and applies to both public and privately-owned land.








Special Purpose Zone: Relates to sites or areas that require special treatment and are of particular consequence to the communities well-being, health and safety but do not conform to the provisions of the standard zones.

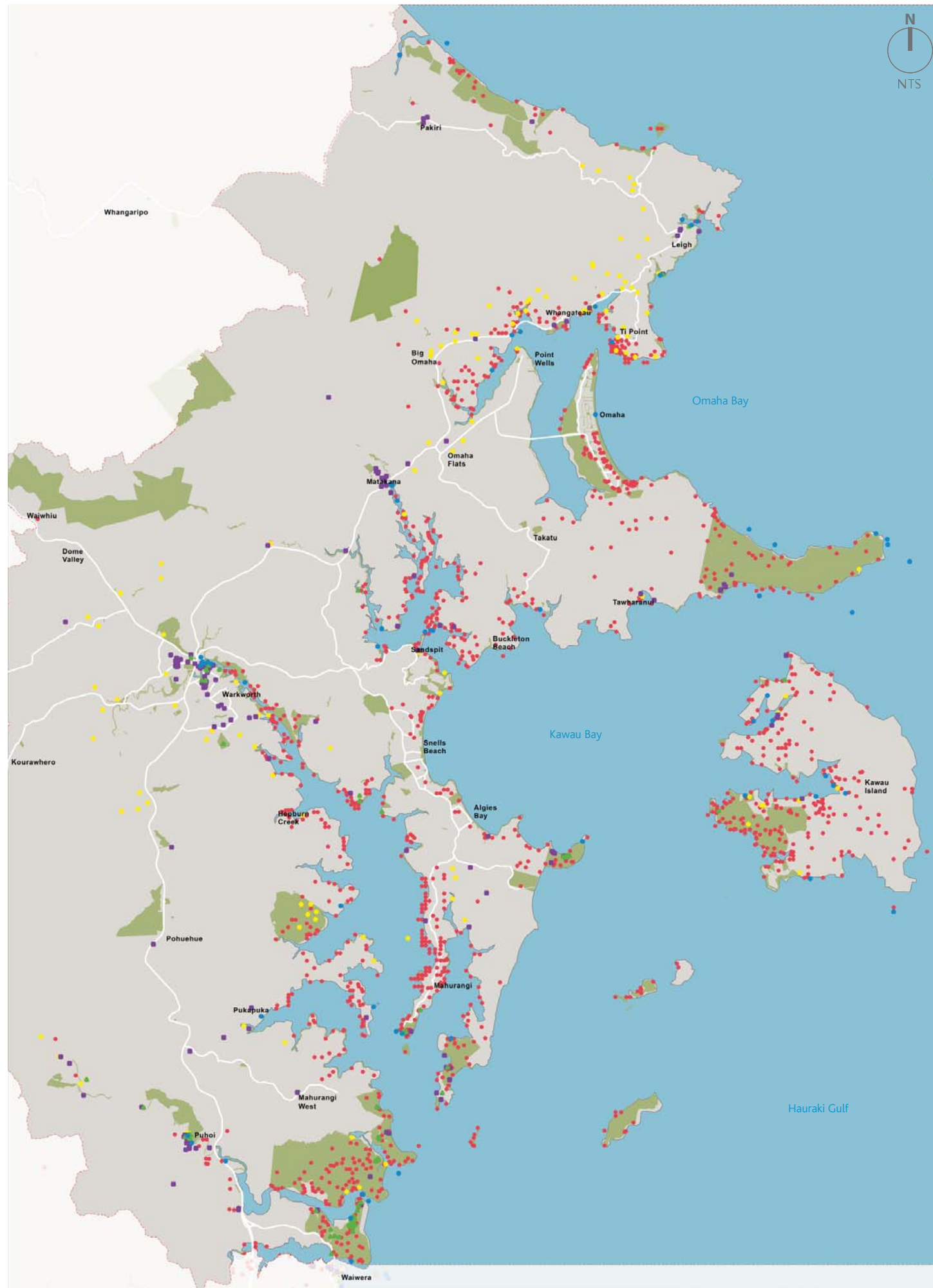
Rural Zone: Is the largest land use, and relates to rural activities including rural production, rural character and amenity, rural industry and services. Rural areas may include areas of ecological significance as well as countryside living.

Future Urban Zone: This zone is applied to land located on the periphery of existing residential areas (Warkworth and Algie Bay), which Council has determined is suitable for future urban development. This is a transitional zone, which provides for the land to be used for rural activities until it is able to be developed, via the structure plan and plan change process. A structure plan or plan change can be initiated by Council, an individual, group or partnership (source; Unitary Plan).

This zoning has potential to create some land use changes, most noticeably allowing the expansion of the Warkworth township in all directions, and an infill of residential in the existing housing area along Algies Bay. While this will result in a more urban feel to these areas, development allows greenways to be integrated seamlessly into new neighbourhoods, and delivered at no direct cost to the ratepayer.

LEGEND:

-  Roads
-  Business
-  Residential
-  Open Space
-  Special Purpose
-  Rural
-  Future Urban



Cultural Heritage Inventory

This map shows sites that were identified by the Cultural Heritage Inventory (CHI) that was created by the former Auckland Regional Council. The CHI was established to promote sustainable management of our cultural heritage by providing easy access to relevant information, and should be used as a resource when developing the network.

CHI sites are classified as follows:

- **Archaeological Sites** - e.g. midden and pa sites;
- **Historic Botanical Sites** - e.g. specimen trees;
- **Built Heritage Sites** - e.g. typically early European buildings;
- **Maritime Sites** - e.g. shipwrecks, wharfs, boat sheds; and
- **Reported Historic Sites** - e.g. known locations of battles.

Compared to other parts of Auckland, there are a relatively high number of recorded archaeological sites within the study site. Many of these sites are clustered along the coastal edge, illustrating the significance of this area to Maori - the coastal margins typically being desirable for occupation and food gathering, and the high points of the land providing vantage points for a number of Pa.

The built heritage sites suggest early European settlements were predominantly located in the Puhoi, Warkworth and Matakana centres.

The greenways routes will take in many of these historic sites, especially those along the waterways and coastline. While this may create development constraints, it also adds greatly to the interest of the routes.

LEGEND:

- Parks and Reserve Land
- Roads
- Archaeological Site
- Historical Botanical Site
- Built Heritage Site
- Maritime Site
- Reported Historic Site

B. Case Studies

B.1 Lloyds Crossing, Portland (USA)

Lloyds Crossing in Portland is a brownfields redevelopment site in the central city area, with the aim of:

"Developing a conceptual design for a sustainable, financially feasible, mixed-use development project that will catalyse future private development in the district.. Following conceptual master planning, a stakeholder engagement process is now underway, to create the 'Lloyd Green District'"

Co-conveners of the stakeholder group are the Mayor of Portland, Council President Metro and Multnomah County Commissioner. Forming the "Lloyd Green District," the group includes sponsors (Portland Development Commission, METRO, City of Portland and Lloyd TMA/BID), invited property owners, employers and developers in the proposed district area and other local and state agencies and civic organizations.

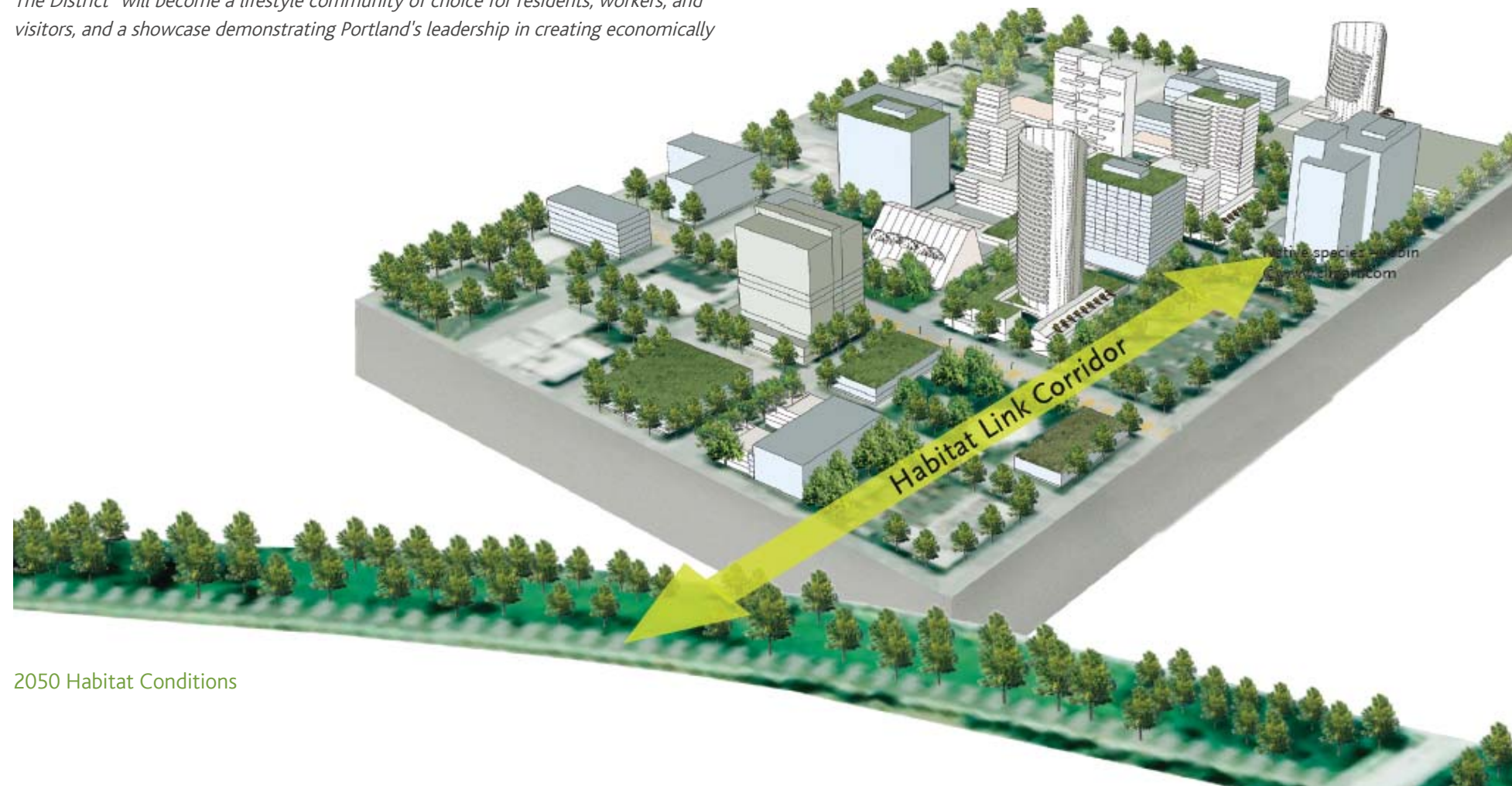
Their goal is to:

"create a premier sustainable multi-use development district within an urban center." The District "will become a lifestyle community of choice for residents, workers, and visitors, and a showcase demonstrating Portland's leadership in creating economically

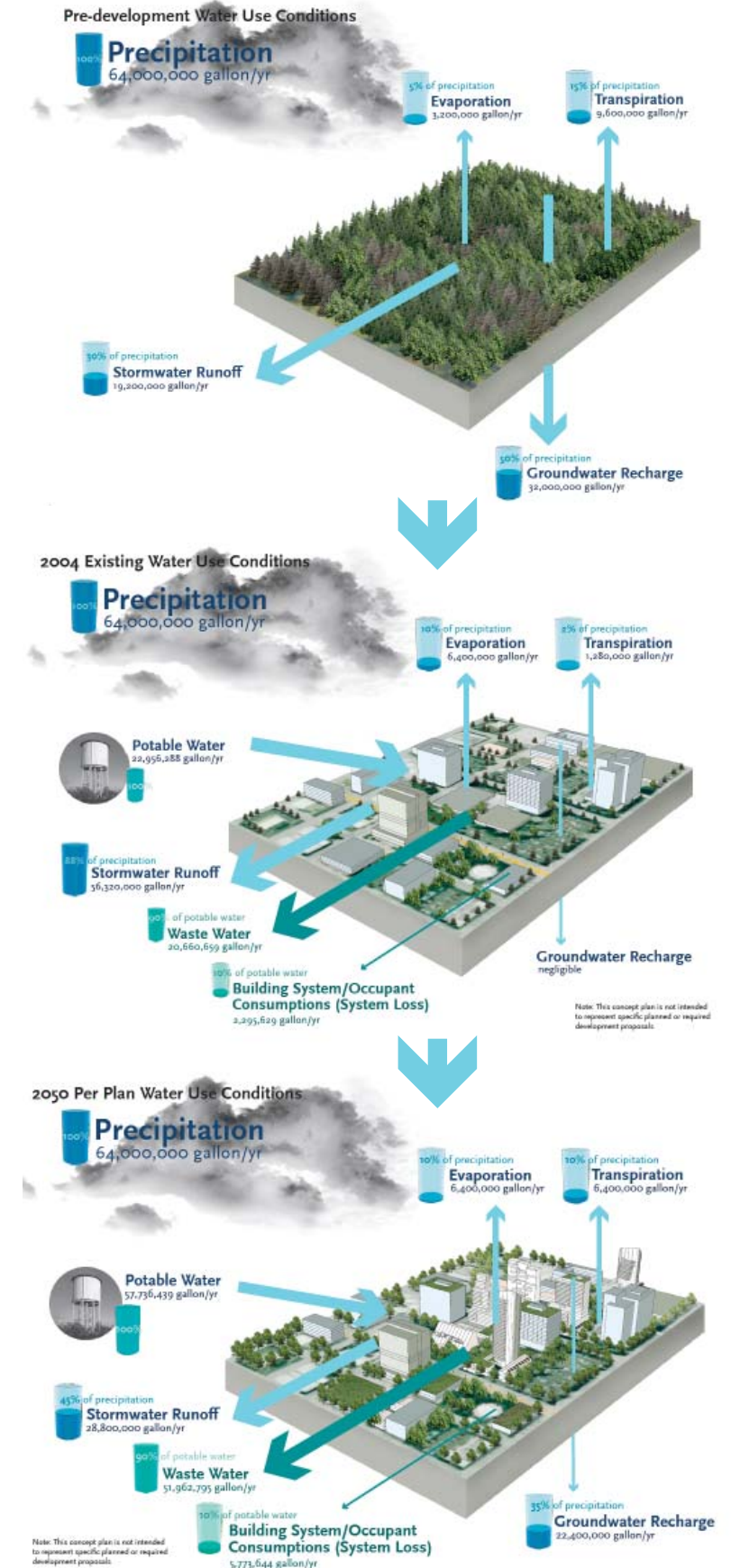
viable earth-friendly development."

This will become one of the first redevelopments under Washington State's developing programme of Climate Benefit Districts - a programme which aims to:

- support the creation of "green jobs";
- support livable, diverse and affordable urban neighbourhoods;
- reduce the impact of urban development on the environment;
- capture the innovations and life cycle cost savings for district level energy and infrastructure solutions;
- rebuild and reinvest in communities in ways that reduce the demand for driving;
- help public and private interests to work together in developing healthy, vibrant urban communities aimed at achieving carbon reduction goals;
- send a clear policy signal to attract desirable private investment and coordinate public action from multiple levels of government; and
- give communities the means to meet major environmental and economic challenges while remaining responsive to local conditions and opportunities.



2050 Habitat Conditions



B.2 Portland Green Streets (USA)

Portland has been designing and building Green Streets for many years. Their consistent monitoring has proven that they successfully reduced peak stormwater flows and runoff volumes. The images to the right show a variety of Green Streets in Portland that have been successfully implemented.

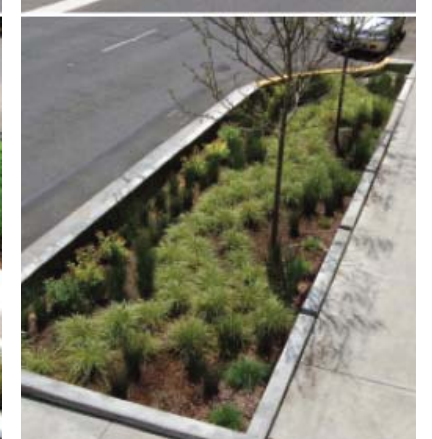
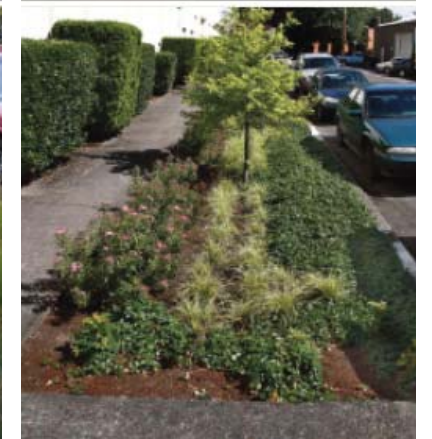
Green Streets convert impervious street surfaces into green spaces that capture stormwater runoff and allow the water to permeate through the ground as plants and soil remove pollutants. Green Streets help to create attractive open spaces, streetscapes, provide ecological urban habitats, and help to connect neighbourhoods, open spaces, schools and other areas within the city.

The city of Portland is:

"Committed to green development practices and sustainable stormwater management. Green Streets are an innovative, effective way to restore watershed health. They protect water quality in rivers and streams, manage stormwater from impervious surfaces, and can be more cost efficient than new sewer pipes. Green Streets offer many benefits that sewer pipes can't."

Green Streets offer the following benefits:

- convert stormwater from a waste diverted into a pipe, to a resource that replenishes groundwater supplies;
- 80%+ of storm water volume to be infiltrated on site;
- add urban green space and wildlife habitat;
- reduce stormwater in the sewer system;
- save money on wastewater pumping and treatment costs;
- use plants and soil to slow, filter, cleanse, and infiltrate runoff; and
- design facilities that aesthetically enhance the neighbourhood livability and property values.



B.3 Jellicoe Street, Auckland (NZ)

Jellicoe street features over 600m² of purpose-built rain gardens. Run-off from over 9000m² of the surrounding roads and surfaces flows into the rain gardens. Other key objects for the project include:

- integrate Best Practice Stormwater Design and the efficient use of water resources;
- re-use existing structures and infrastructure where possible
- generate renewable energy on site;
- preserve coastal water quality and protect waterfront ecologies;
- protect air quality and reduce traffic congestion;
- improve permeability and establish pedestrian priority and safety;
- facilitate better access and circulation between transport modes;
- enable visual connections through the precinct to the water; and
- promote pedestrian and cycle activity.

This new initiative in a high-use area has proven to be a great way to educate visitors and residents about the merits of low traffic speed, shared space environments and 'green' infrastructure approaches.



B.4 Greenpark, Thames Valley (UK)

This new industrial development is an exemplary model of best-practice industrial/commercial development. It is acknowledged that retrofitting an existing industrial zone (such as that found in Papakura) is a significantly more difficult task than greenfield development, but this case study shows a range of solutions which can be employed to improve conditions for workers, visitors and the environment. Solutions employed at Greenpark include:

Landscaped parkland:

- a network of cycleways;
- nature trails; and
- paths running around the banks of the stormwater treatment wetlands.

Community life:

- frequent, comfortable buses to bring people into Green Park from Reading station or nearby town centres;
- well-maintained, well-lit walkways make it easy to get around the Park;
- cafés and restaurants;
- health club;
- a day nursery; and
- acres of natural parkland.



Event hosting:

- Events throughout the year, attract workers and nearby residents alike, and these include a range of organised annual events and one off events, including the Reading half-marathon and the Corus Triathlon. Longwater Lake also hosts regular angling competitions.

Green energy (wind and solar):

- The development generates 2.3 megawatts of clean energy, enough to power around 1200 homes.

Green Park fast track:

- A fleet of low emission eco-friendly buses. These are among the first in the UK to meet the stringent 'Euro 4' European emission standards and produce significantly lower levels of carbon dioxide and nitrogen oxide than regular fleets.
- Buses include full wireless access and a real time information system for maximum passenger comfort and security.

