Fylde Sand Dunes
Management Action Plan

a report produced on behalf of the
Fylde Sand Dune Project Steering Group

compiled by
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All photographs taken by Graeme Skelcher on the Fylde Coast, summer 2008, unless otherwise stated

CONTENTS

1 EXECUTIVE SUMMARY

1.1 Introduction

The majority of the Fylde coastal frontage between Squire's Gate and Lytham Green is covered by sand dune, but this is a very small and narrow fragment of what should naturally occur, and of what formerly occurred just some 150 years ago (Map 1). This substantial loss and fragmentation of dune habitat has been caused by a century or more of housing, transport and other built development; most significantly over the inland dunes (and particularly following the creation of St Anne's in 1875) but which has continued to erode the area of coastal dunes up until as recently as the mid-1990s.

Dunes are highly vulnerable to human impact. Offshore and structural developments along the coastline can alter coastal dynamics and interrupt or decrease the supply of sediment. Direct loss of habitat by built development within British dunes has been extensive and is typified by the estimated 84% decline of dune habitat on the Fylde Coast since 1839. Considerable erosion of the remaining dune can occur through recreational activities which prevent proper natural development of the dune system.

Conditions are currently favourable for natural sand dune accretion at Starr Hills and St Anne's due to a combination of natural movement of sand sediment from the Irish Sea bed and man-made intervention within the Ribble Estuary. This is in contrast to most British dunes systems which are either eroding due to loss of sediment and rising sea-levels, or are only accreting because sediment is being eroded from another nearby part of the coast.

Sand dune is a scarce habitat in Britain today, with less than 10,000 ha remaining in England. About a third of the English dune resource is in north-west England, with the most extensive examples being the internationally significant dunes at Sefton in Merseyside and Walney Island, Sandscale Haws and Drigg in Cumbria. Despite the enormous losses to built development, the Fylde Dunes still represent almost 1% of the total area of dune in England.

Sand dunes provide a vitally important habitat to a wide range of wildlife, including a large number of species which are incapable of surviving in any other habitat, and many of these are of national or international significance. The value of sand dune for nature conservation has been recognised by its inclusion on Annex1 of the *EC Habitats Directive* and by being listed as a Priority Habitat for conservation in the *UK Biodiversity Action Plan*. Fixed dune and decalcified fixed dune (i.e. dune heath) are additionally considered priority habitats in Europe under the *EC Habitats Directive*. On the Fylde Coast, an area of inland dune was declared a Local Nature Reserve in 1968, the Reserve and adjacent area of coastal dune at Starr Hills was designated a Site of Special Scientific Interest (SSSI) in 1991 and most of the remaining dune habitat was classified as Biological Heritage Site (BHS) in 1997.

Dunes are also extremely important because of their flood-defence properties; both by providing a barrier to inundation and by releasing sand during storm conditions to reduce wave action. This natural coastal defence is hugely cost-effective compared to the expenses incurred in maintaining the alternative sea-walls and other hard coastal defences, and often far more efficient. While much depleted, the remnant dunes in Fylde Borough still form the most significant part of the Borough's coastal defence.

Sand dunes are also popular for informal recreation and hence indirectly generate revenue for the local economy.

Other natural coastal habitats along the Fylde Coast include accreting saltmarsh over more muddy sediments which are subject to more frequent tidal inundation at Lytham and Fairhaven, as well as a small area of more mature marsh at Granny's Bay. This habitat also has a very high value for wildlife, and again is listed on Annex 1 of the *EC Habitats Directive* and as a Priority Habitat for conservation in the *UK Biodiversity Action Plan*. The saltmarsh and mudflats of the adjacent Ribble Estuary also form a designated Ramsar site, Special Protection Area (SPA) and SSSI for their internationally important numbers and assemblage of waterfowl. Saltmarsh is also extremely important as part of the Coast's flood defence due to its efficacy in reducing the wave action before the coastline is reached.

A narrow band of shingle is also present between the sand dunes and accreting saltmarsh at Fairhaven. Currently this supports very few plants due to frequent disturbance which is preventing establishment of vegetation, but potential exists for development of coastal vegetated shingle which is a rare habitat and, again, is listed on Annex 1 of the *EC Habitats Directive* and as a Priority Habitat for conservation in the *UK Biodiversity Action Plan*.

1.2 The Management Action Plan

This document has been commissioned by the Fylde Sand Dune Project Steering Group in order to evaluate the importance of the Fylde Sand Dunes and other natural coastal habitats and to suggest management proposals in order to maintain or enhance the key features. Funding for the project was provided by the Local Strategic Partnership (LSP)

The main areas under consideration in this document are the coastal habitats from Squire's Gate in the north (at the northern limit of the Fylde Borough boundary), continuing southwards and eastwards around the coast to the western edge of Lytham Green; most of which is owned by Fylde Borough Council or Blackpool Borough Council. Brief consideration is also given to the inland, and privately-owned, sand dunes of the golf courses, Clifton Hospital and the King Edward & Queen Mary School (Map 2).

The main aims for management of the Fylde Sand Dunes are to

- enhance the nature conservation interest of the coastal habitats,
- improve the efficiency of the dunes and saltmarsh as soft sea-defence (with associated cost-savings in maintenance of hard sea-defences) and
- enhance public appreciation and enjoyment of the dunes.

These aims will be addressed under the more specific operational objectives listed below:

1. Enhance the nature conservation value of the sand dune and other natural coastal habitats, including the shingle bed and accreting saltmarsh.
2. Increase the area of sand dune and saltmarsh habitats where appropriate, particularly by allowing conditions for natural seaward accretion.
3. Maintain and, where appropriate, enhance sea defences, with natural accretion of sand dune and saltmarsh forming the primary defence and repairs to hard defences only undertaken where current or potential soft defence is not adequate.
4. Promote knowledge, understanding and appreciation of the ecological value of the sand dunes and other natural coastal habitats, and of their key role in coastal flood defence.
5. Enable safe recreational use of the dunes and beach where this does not significantly compromise the nature conservation or flood-defence properties of the dunes and other natural coastal habitats.

Proposed management works to achieve these aims will include enabling natural seaward accretion of the dunes by removing the current causes of man-induced erosion (both to increase the area of wildlife habitat and to improve the efficiency of flood defence), together with grassland and scrub management works to enhance the nature conservation value of the existing dunes.

Work was also undertaken during the course of this contract to compile all known biological records for the coast. These species lists are held by the Wildlife Trust and Fylde Borough Council. Mapping of nationally and locally important vascular plant species was also carried out during the summer of 2008. The results for nationally important plants are presented in this document (Map 5). The results for locally uncommon species will be presented in a separate document (Skelcher 2009).

Scientific names for species follow the most recent recommended nomenclature suggested by Natural England wherever possible. For vascular plants this follows the nomenclature proposed by Stace (1997)

1.3 Sand Dune Formation

Sand dunes form where:-

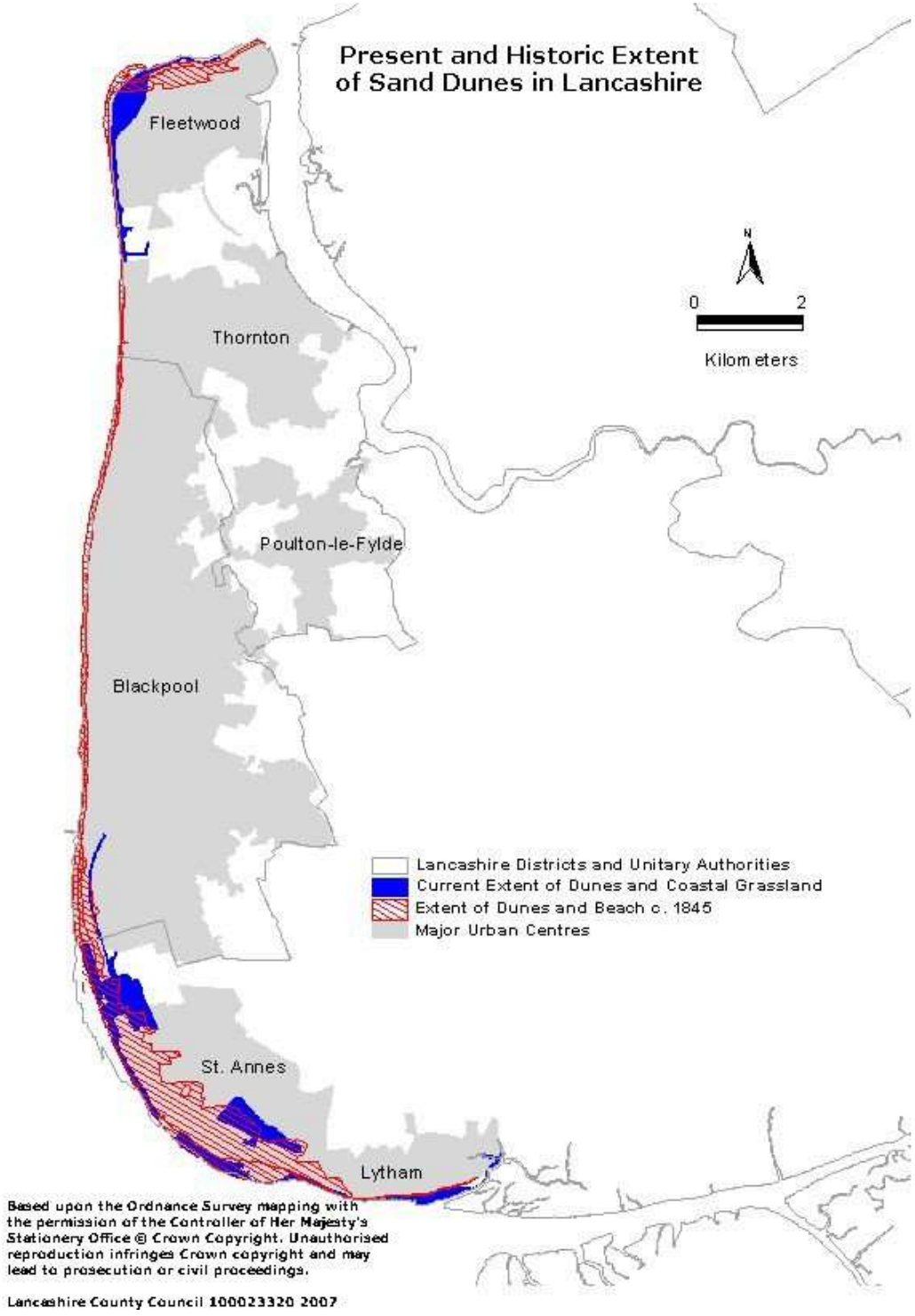
- there is a supply of sand over a wide foreshore which has sufficient time to dry between tidal inundation,
- a backshore area of low relief and
- predominant onshore winds for at least part of the year.

Initially wind-blown sand accumulates around small objects such as clumps of seaweed, driftwood or other debris cast along the strandline. Ideal conditions for the transport of sand from a beach to the dunes occur after low-height and long-period waves have deposited sand on the upper beach and inter-tidal foreshore. At low-tide, the sand dries and onshore winds can carry substantial volumes of sand onto the dunes. Once formed, low hills of loose sand are then colonised by salt-tolerant, pioneer plants that both increase the resistance of the surface layer of sand to wind erosion and reduce the wind-speeds. The embryo dunes, or foredunes, will continue to grow unless they are destroyed by wave action at high tide levels. The main pioneering colonisers of loose sand include sand couch-grass *Elytrigia juncea* and lyme-grass *Leymus arenarius* which are able to withstand short periods of immersion by seawater and have long roots, rhizomes and runners which are able to bind the surface grains and extend the vegetation cover laterally.

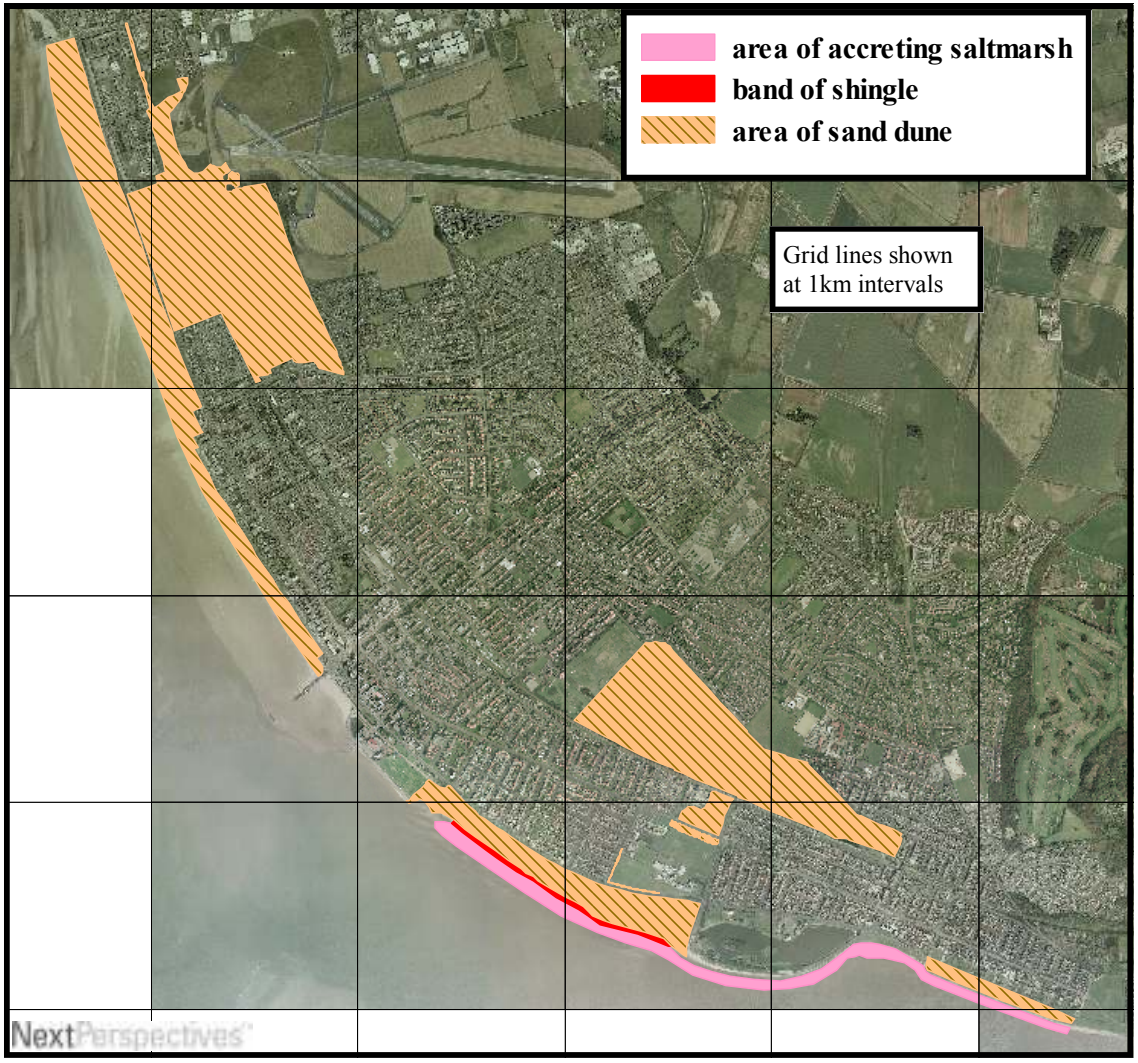
As the foredunes grow vertically above the level of wave run-up, they are colonised by marram *Ammophila arenaria* which thrives on continual burial by the blown sand deposits. The marram dominated dunes remain unstable due to the exposure of sand between the clumps of vegetation. If new foredunes develop in front of the mobile dunes, the marram ceases to be supplied with fresh sand deposits and other species colonise and stabilise the dune surface. The composition of the formed fixed dunes then varies depending upon soil chemistry but is often quite calcareous. Fixed dunes are usually dominated by red fescue *Festuca rubra* and support a much higher diversity of species than mobile dunes. As the fixed dunes age, they lose lime and develop a flora with common bent *Agrostis capillaris* and patches of heather *Calluna vulgaris* which is known as dune heath.

Dune slacks are damp, low-lying areas between dune ridges which can be particularly rich in plant species including creeping willow *Salix repens*, sedges, rushes, orchids and mosses.

Map 1: Present and historic extent of sand dunes in Lancashire - reproduced from the *Lancashire Biodiversity Action Plan* (Serjeant 2001)



Map 2: The Fylde Dunes and other coastal habitats considered within this management plan



2 DESCRIPTION

2.1 Location

Sand dunes cover much of the Fylde Coast between Squire's Gate and Lytham Green (see Map 2). There are also fragmented areas of dune inland at the Lyham St Anne's Local Nature Reserve (LNR), the St Anne's Old Links and Royal Lytham St Anne's golf courses, the grounds of the Clifton Hospital and on the perimeter banks of the King Edward & Queen Mary School. Other natural habitats on the Fylde coast include accreting saltmarsh from Fairhaven to Lytham Green and a narrow strip of shingle at Fairhaven.

Local Planning Authorities: Fylde Borough Council, Lancashire County Council

Grid Reference:

Coastal Dunes and Local Nature Reserve

- Lytham St Anne's Local Nature Reserve SD 311 306 (at central point)
- Starr Hills Dunes SD 308 311 (at central point)
- St Anne's Dunes SD 315 292 (at central point)
- Fairhaven Dunes SD 329 277 (at central point)
- Lytham Dunes SD 351 271 (at central point)

Inland Dunes

- Clifton Hospital SD 337 279 (at central point)
- King Edward and Queen Mary School SD 336 279 (at central point)
- Royal Lytham St Anne's Golf Course SD 338 283 (at central point)
- St Anne's Old Links Golf Course SD 314 309 (at central point)

Access: There is unrestricted access to most of the coastal dunes and the Local Nature Reserve from Clifton Drive North, North Promenade, South Promenade and Inner Promenade. Unrestricted car parking is available on the roadside along part of North Promenade and the Inner Promenade and restricted roadside parking is available on Clifton Drive North, North Promenade and South Promenade. Free parking is also available at the North Beach car park (off Clifton Drive North), while pay-and-display car parks are available at the North Promenade and Pier car parks (off North Promenade), opposite Fairhaven Road (South Promenade) and at Fairhaven Lake (Inner Promenade).

Area:

Coastal Dunes and Local Nature Reserve ***68.9 (Total for coastal dunes & LNR)***

- Lytham St Anne's Local Nature Reserve 16.3 ha
- Starr Hills Dunes 26.3 ha
- St Anne's Dunes 6.7 ha
- Fairhaven Dunes 15.6 ha
- Lytham Dunes 4.2 ha

The above include areas of degraded or heavily eroded dune

Inland Dunes

- Clifton Hospital 2.8 ha
- King Edward and Queen Mary School 0.8 ha
- Royal Lytham St Anne's Golf Course 50 ha
- St Anne's Old Links Golf Course 47.3 ha

Areas given for the inland dunes are the total areas of the designated Biological Heritage sites. The golf course areas include significant areas of intensively managed golf-playing area as well as dune habitat.

Maps: 1:50,000 - O/S Landranger 102 Preston & Blackpool
1:25,000 - O/S Explorer 286 Blackpool & Preston
1:10,000 - SD33SW, SD32NW, SD32NE

2.2 Land Tenure

The principal landowners of the Fylde Sand Dunes are:

- Fylde Borough Council - Lytham St Anne's LNR, Starr Hill Dunes to the south of Thursby Nursing Homes, St Anne's Dunes, Fairhaven Dunes and Lytham Dunes.
- Blackpool Borough Council - Starr Hills Dunes to the north of Thursby Nursing Homes.
- Thursby Nursing Home - walled field adjacent to the home.
- Blackpool, Fylde & Wyre NHS Foundations Trust - field adjacent to the Clifton Hospital.
- King Edward and Queen Mary School - dune banks around school perimeter
- Royal Lytham St Anne's Golf Club - golf course.
- St Anne's Old Links Golf Club - golf course.

A small area (*c* 0.5 ha) in the northern part of St Anne's Dunes is also in private ownership, though this area is not partitioned in any way from the surrounding open-access land owned by Fylde Borough Council.

Public Access:

Unrestricted access to the coastal dunes and Local Nature Reserve owned by Fylde Borough Council and Blackpool Borough Council (outside enclosed compounds).

A public footpath crosses part of Royal Lytham St Anne's Golf Course and another runs along the edge of the St Anne's Old Links Golf Course. Otherwise, access to private land is by arrangement with the owners only.

2.3 Status

Site of Special Scientific interest

Lytham St Anne's Dunes SSSI (24.5 ha covering Lytham St Anne's LNR and part of Starr Hills Dunes); notified under 1981 Act: 1991

Lytham Coastal Charges SSSI (0.7 ha within coastal dune area covering damp grassland at rear of Fairhaven Dunes opposite King Edward & Queen Mary School) ; geological SSSI notified under 1981 Act: 1999

Local Nature Reserve

Lytham St Anne's Local Nature Reserve (16.3 ha); declared 2 July 1968

Lancashire Biological Heritage Sites
Lytham Foreshore, Dunes and Saltmarsh BHS 32NW01 (227.7 ha)
Clifton Hospital Site BHS 32NW02 (2.8 ha)
King Edward VII and Queen Mary School Playing Field Margins BHS 32NW05 (0.8 ha)
Royal Lytham St Anne's Golf Course BHS 32NW03 (50 ha)
St Anne's Old Links Golf Course and Blackpool South Railway Line BHS 33SW02 (47.3 ha)

The dunes also lie adjacent to the Ribble Estuary SSSI (9,286 ha) and the Ribble & Alt Estuaries SPA (12,332 ha).

2.4 Fylde Borough Council Planning Policy

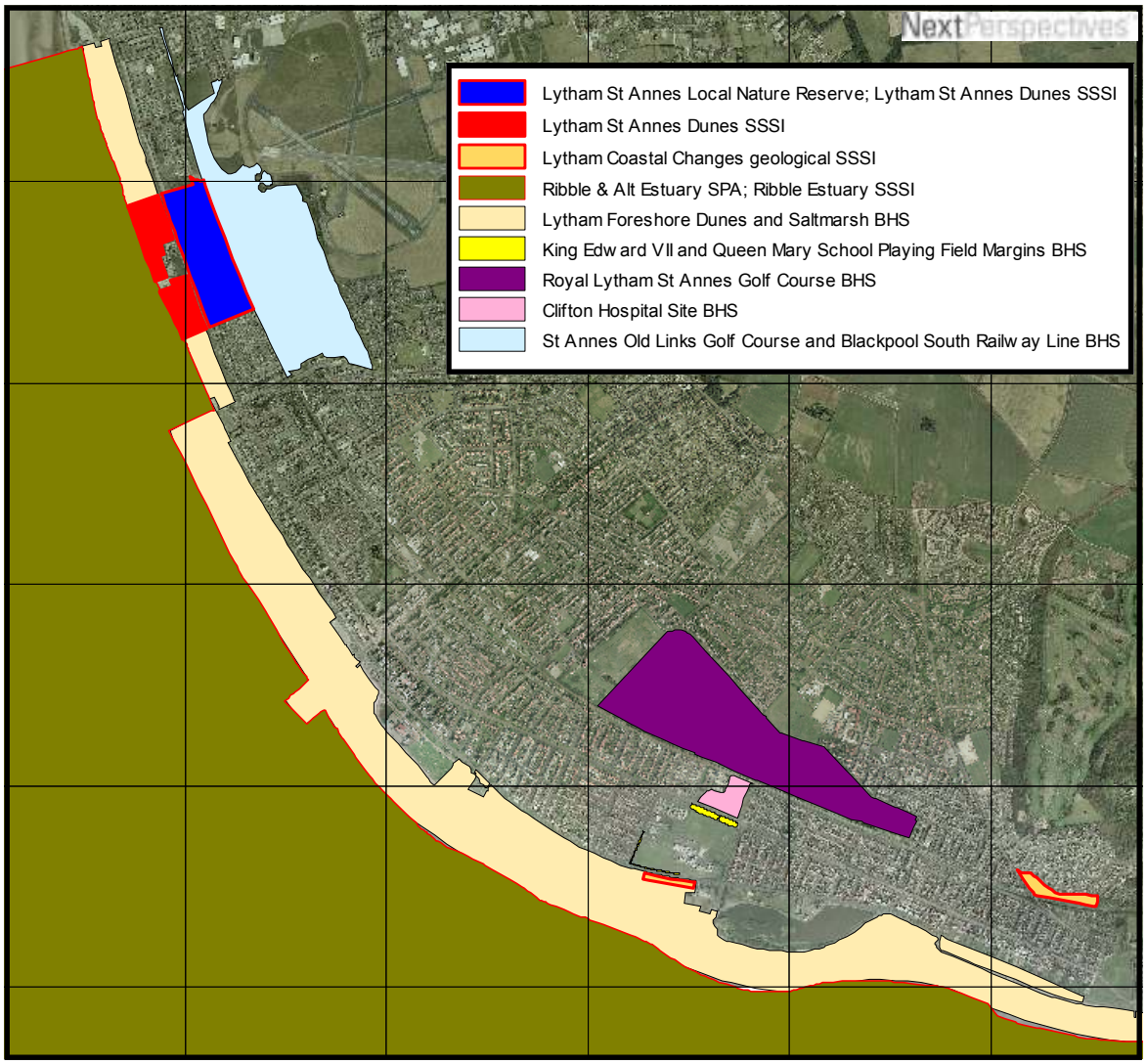
The areas of coastal habitats within the Special Protection Area, the Sites of Special Scientific Interest and the Biological Heritage Sites are protected from most forms of development respectively under Policies EP15, EP16 and EP17 of the *Fylde Borough Local Plan* (2005). Additional areas of natural coastal habitats are protected under Policy EP10.

The area of dunes and open sand to the north of the Coastguard Station (including the Local Nature reserve) is additionally classed as Green Belt and protected against certain forms of development by Policies SP3, SP5 and SP6.

The St Anne's Old Links and Royal Lytham St Anne's golf courses are protected against development other than for golfing purposes by Policy TREC 15. The public open space around Fairhaven Lake and at Granny's Bay is protected under Policy TREC 13. The formal gardens on St Anne's Promenade, at the rear of the Pleasure Island complex, are protected from development by Policy EP6, while the limits of development of the pier and St Anne's seafront are defined by Policies TREC 9 and TREC 8 respectively.

Two areas which lie within the general dune area and which have high potential for restoration to dune habitat are currently shown in the *Local Plan* to be included within an area where development could be permitted as covered by Policy SP1. These are the North Beach car park, next to the Coastguard Station, and the Fairhaven Pumping Station. The latter site presently includes large areas of dune grassland.

Map 3: Nature Conservation Status of the Fylde Sand Dunes and other Coastal Habitats



2.5 Summary Description

Most of the Fylde coastal frontage between Squire's Gate and Lytham Green is covered by sand dune, but this is a very small and narrow fragment of what should naturally occur. While a reasonable range of dune types occur along the coast (ranging from pioneer dunes accreting at the seaward edge, through mobile and semi-fixed dune hills to the more stable dune grasslands and wet dune-slacks), because of the restricted width of the dunes there is rarely a continuous development of these stages from sea to landward edge but rather different types are more or less prominent along the coast where circumstances allow.

The northern section of the coastal dunes at Starr Hills has some patchy pioneer and foredune vegetation, including scattered prickly salt-wort *Salsola kali* and small stands of sand couch-grass *Eltrigia juncea* and lyme-grass *Leymus arenarius,* along much of its length. The majority of this section of dunes comprises mobile dunes, dominated by the dune-building grass marram *Ammophila arenaria*. This zone covers the full width of the dunes in the north, opposite Pontins holiday camp, up to the inland barrier of Clifton Drive North. Much of this area is heavily eroded due to pedestrian crossing of the dunes from the road and Pontins to reach the beach, and the large areas of bare sand are leading to problems with wind-blown sand falling onto the pavement, highway and inland properties. More stable dunes with mature slack occur on the flatter ground on both sides of Thursby Nursing Home, though this was largely created by artificial lowering of the rear dunes in the 1970s to reduce the amount of wind-blown sand across Clifton Drive. Several of the more notable dune-plant species are now found in this area, including dune helleborine *Epipactis dunensis*, green-flowered helleborine *Epipactis phyllanthes*, early marsh orchid *Dactylorhiza incarnata* subsp. *coccinea* and round-leaved wintergreen *Pyrola rotundifolia* subsp. *maritima* as well as locally abundant orchids including pyramidal orchid *Anacamptis pyramidalis*, southern marsh orchid *Dactylorhiza praetermissa* and marsh helleborine *Epipactis palustris*. However, this area is currently very overgrown with dense creeping willow and rank grasses, making conditions increasingly less suitable for the rarer plants. The walled field adjacent to Thursby Nursing Home is also of interest, particularly at its southern end, and includes one of only two known stands of the nationally scarce variegated horsetail *Equisetum variegatum* on the Fylde Coast as well as the nationally scarce seaside centaury *Centaurium littorale* and its hybrid *C.* x *intermedium*.

eroded dunes at Starr Hills opposite Pontins

walled field next to Thursby Nursing Home


Lytham St Anne's Local Nature Reserve

Separated from the coastal dunes of Starr Hills by the hard barrier of Clifton Drive North, the Lytham St Anne's Local Nature Reserve nevertheless supports an impressive range of dune wildlife and habitats. This is the only area on the coast where substantial wet dune slacks can be found, and the associated helleborines, orchids and other dune-slack species are generally much more numerous here than elsewhere in the Fylde Dunes. The largest slack includes a stand of the internationally rare Baltic rush hybrid *Juncus balticus* x *J. inflexus* which is endemic to the Lancashire and Sefton coast. Between the slacks are small hills of mobile and semi-fixed vegetation, and these support a good population of Isle of Man cabbage *Coincya monensis* subsp. *monensis* (another plant species which is endemic to the west coast of Britain) and have previously supported colonies of yellow bird's-nest *Monotropa hypopitys* although 2008 appeared to be a poor year for this species and none were found in this summer. To the rear of the Local Nature Reserve, areas of grassland have become rank and dominated by false oat-grass *Arrhenatherum elatius*.


St Anne's Dunes

The dunes at St Anne's, to the south of the Coastguard Station up to St Anne's Pier, comprise a thin strip of mostly mobile dunes with some semi-fixed dunes to the roadside. The nationally scarce dune fescue *Vulpia fasciculata* is widespread in this section, while Isle of Man cabbage is common in the area to the north of the Pier. The narrowness of the dunes allows wind-blown sand to become a problem on the adjacent North Promenade, particularly opposite Todmorden Road where the dunes are more-or-less absent and have been replaced by a concrete bank. Much of the rear dune in the southern half of this section is covered by white poplar *Populus alba*, which is a non-native and invasive shrub within sand dunes and which is spreading here at the expense of the natural dune vegetation.

To the south of St Anne's Pier there is a substantial gap in the dunes. Immediately to the south of the Pier is an open area of public beach right up to the promenade wall and to the south of this are the public gardens and amusements of the Pleasure Island complex which is contained from the sea by a concrete wall.


Fairhaven Dunes

The dunes resume at Fairhaven, extending from the south of Pleasure Island to the edge of Fairhaven Lake. Mobile dunes cover a thin strip along the coastal edge of this section. To the east this gives way to the rear to a broader band of semi-fixed dune hills and rank grassland with local damp areas along the roadside. In the western half of this section, however, the mobile dunes give way to heavily managed amenity grassland which has been claimed from potential dune grassland. Isle of Man cabbage and dune fescue are widespread throughout the mobile and semi-fixed dunes of this area, while the nationally scarce sticky stork's-bill *Erodium lebelii* is also found. There are also a number of locally uncommon species scattered throughout this area including Portland spurge *Euphorbia portlandica* (until recently classified as nationally scarce), hound's-tongue *Cynoglossum officinale* and common broomrape *Orobanche minor*, while a small stand of flat-sedge *Blysmus compressus* occurs in a damp area near the roadside.


Lytham Dunes

The truly coastal dunes end at the western edge of Fairhaven Lake, but a small strip of dune vegetation persists at the top of the sea-wall to the west of Lytham Green. This comprises a frontal strip of mobile and semi-fixed dune vegetation mostly backed by rank grassland with many exotic plant species which have spread from gardens. The dunes here are generally poorer than elsewhere on the coast, but there are a few Isle of Man cabbage plants, a scatter of sand cat's-tail *Phleum arenarium* and some typical dune-grassland herbs such as wild thyme *Thymus praecox* and bird's-foot-trefoil *Lotus corniculatus* as well as, more unusually, crested hair-grass *Koeleria macrantha*.

Between the dunes of Fairhaven and Lytham, the sea-front is marked by a concrete wall around Fairhaven Lake while there is a small area of saltmarsh backed by a low sea wall at Granny's Bay. A band of saltmarsh is also accreting in front of the Fairhaven Dunes, separated from the dunes by a narrow band of shingle. A more open cover of saltmarsh plants is developing in the mud beneath the sea-wall around Fairhaven Lake and there is also local accretion of saltmarsh beneath the sea-wall at Lytham.

bands of saltmarsh (including sea club-rush) and shingle at Fairhaven

Inland there are further fragments of dune habitat which have been separated from the coast by road and other developments. The banks around the perimeter of King Edward and St Mary School and the grounds of Clifton Hospital support dune vegetation which has become rather rank through lack of management. The UK endemic purple ramping-fumitory *Fumaria purpurea* was found on the School banks in 2001, and relocated in 2004 and 2005, but was not seen in 2008, while bur chervil *Anthriscus caucalis* was recently rediscovered here after an absence of nearly 100 years in its only North Lancashire location. Dune vegetation also persists within the roughs of the Royal Lytham St Anne's golf course and the St Anne's Old Links golf course, where small but significant areas of the very rare oceanic lowland dune heath occur.

rank dune grassland in Clifton Hospital grounds

The dunes provide habitat for a wide range of invertebrate species, which are often specialists of dune habitats and unable to survive elsewhere, and also support a population of common lizard. Breeding birds within the dune habitats include reed bunting, skylark, linnet and stonechat, while the accreting saltmarshes of the Fylde Coast, though not currently included in the Ribble Estuary SSSI, will contribute to the importance of the estuary for species such as grey plover, sanderling, redshank, bar-tailed godwit, shelduck, oystercatcher, knot and dunlin.

oystercatcher at high-tide at Fairhaven

While the Fylde Dunes are undoubtedly rich in wildlife and also provide the main barrier for flood-defence along the coast, they have become significantly reduced and fragmented over the years. The inland dunes, including the Local Nature Reserve, have been separated from the coastal dunes (and, by consequence, the sand which is their primary source of replenishment) by a series of roads (Clifton Drive North, North Promenade, Central Promenade and Inner Promenade) and most of the former area of inner dunes has been lost beneath developments of housing, golf courses and the airport. Within the coastal dunes there are storage compounds for sporting clubs, the recently developed residential flats and adjacent nursing home within Starr Hills, a United Utilities pumping station and car parks within St Anne's Dunes, and another car park and United Utilities pumping station within the Fairhaven Dunes, as well as the more substantial developments around Pleasure Island and Fairhaven Lake. All of these cause direct loss of area and fragmentation of the dunes, which hinder dune development and compromise their effectiveness as flood-defence.

Clifton Drive North separating the LNR from the coastal dunes at Starr Hills

2.6 Environmental Information

2.6.1 Physical Features

Geology and Geomorphology
The coastal zone is underlain by Keuper Marl, which forms the sub-drift floor of the whole Ribble Estuary west of Preston. Within this division, the rock falls into the Mercia mudstones sub-division of which the whole coastline south of North Shore in Blackpool is underlain by Singleton Mudstone. Surface deposits are of blown sand overlying alluvium and glacial deposits. Offshore borings undertaken in the Ribble Estuary indicate a sand cover of 10 to 20 metres.

Sea Bed Sediments
There are extensive deposits of sand in the eastern part of the Irish Sea, and the nearshore zone between Squire's Gate and Lytham is characterised by such deposits. As the shoreline moves further upstream, the low tidal energies have led to the formation of sandy-mud deposits and eventual marsh deposits, which are gradually spreading westwards and colonising the upper beach at Lytham and Fairhaven.

Beach Topography
The intertidal zone across the Lytham St Anne's frontage increases in width from approximately 800 m at Squire's Gate to over 3000 m off St Anne's pier. As the shoreline turns into the estuary, the main river channel becomes a prominent feature and the inter-tidal zone width reduces to approximately 2000 m at Fairhaven and 800 m near Lytham Green. The beach level at the toe of the dunes is typically 5m AOD north of St Anne's Pier, between 4 and 5m AOD at Fairhaven and between 3 and 4m AOD in front of the sea wall at Lytham.

Climate
The Fylde Coast falls under the influence of the north Atlantic drift and prevailing westerly winds, which allows a relatively mild climate with an average annual rainfall of around 1000 mm. Snow cover is extremely rare and severe frosts are infrequent, occurring mainly under the influence of northerly or easterly winds.

Wind
Wind is the primary force for locally generated sea waves and for the air-borne movement of dry sand within dune frontages. The highest wind speeds, recorded locally at Squires Gate, are from directions between south-west and north-west, with winds from these directions occurring for nearly 50% of the time.

Waves
Waves that impact the Fylde coastline are generally locally wind generated or result from longer period swell waves that have spread into the Irish Sea from the Atlantic Ocean from the south or from the north. Direct exposure conditions in the south east corner of the Irish Sea are from west to north. In the west to north-west sector, fetch lengths (i.e. the length of open sea across which waves can be generated) are up to 200 km. Further to the north, the Isle of man and the mainland of Scotland reduce fetches to between 100 and 150km. In addition, locally generated waves can be produced over fetches of less than 100km from directions south of west. Typically approximately 50% of offshore waves are generated from directions 250^{o} to 330^{o} (roughly west-south-west to north-north-west) with over 30% from the directions of largest fetch.

Waves are modified as they approach the shoreline by the contours of the sea bed and other factors.

Inshore across the dunes frontage the predominant and highest waves are from the south west to west sector. Due to the wide beach areas and shallow beach gradients, waves that reach the dunes are limited by the depth of the water available for any given tidal condition. Exposure conditions vary for the different dune areas, primarily due to differing foreshore conditions and topography and changing shoreline orientation, but typical wave heights are 1 - 2 m (3 m in extremes) along most of the Fylde Coast but this decreases into the Estuary to less than 1 m in typical conditions (2 m in extremes) at Lytham.

Tidal Water Levels

Coastlines bordering the Irish Sea are subject to the Atlantic tidal wave that spreads into the area via the St Georges channel to the south and the narrower north channel (between Ulster and the Mull of Galloway) to the north. As the tidal wave passes, interactions with the sea bed and landforms produce variations in both elevation and flow patterns. Tides occur twice a day, with a time difference between successive high or low waters of between 12 and 13 hours.

The tidal range increases from north to south on the approaches to the Ribble Estuary; being approximately 7.9 m on spring tides and 4.23 m on neap tides at Blackpool and 8.23 m on spring tides and 4.65 m on neap tides at the Ribble Bar. Tide levels are affected by environmental and atmospheric conditions such as changes in barometric pressure.

Tidal Currents

Tidal flows on the flood tide are generally from west to east, into the Ribble Estuary. Salter's Bank appears to divide the flow so that the flows divert northward nearer the coast and currents in the very shallow water near the coastline are low. Some dry areas can remain over Salter's Bank and in the Ribble Estuary. On the ebb tide, the flows are essentially reversed, being from east to west, with some southerly flow from Cleveleys to just south of Blackpool. The residual flow is generally from offshore, south to north across the mouth of the Ribble Estuary. Residual circulations are seen over Salter's Bank (clockwise), with residual flow over the shallowest area of Salter's Bank being southerly.

Sediment movement

Sediment transport across the south western corner of the Fylde peninsula is dominated by a combination of wave and tidal effects. There is an onshore feed of sediment from offshore across the west facing coast of the Fylde with finer sediment transported landward towards the shoreline and into the estuary from offshore. Inshore transport of sand is southerly across the frontage with an estimated feed of sediment of about 200,000m^3 per annum from the Blackpool frontage towards the Ribble. Residual circulations in the outer estuary mean that material is held within the system around adjacent banks with a consequence that the area is generally accreting. Salter's Bank is a major area of sand deposition with a weak clockwise residual flow circulation around the bank that locally influences sediment movement.

2.6.2 Biological Features

Flora

Over 280 species of vascular plant species have been recorded within the Fylde Dunes; over 50 of which are nationally or regionally notable. The distribution of some of the rarer species on the Fylde Coast is shown on Map 5 (pp 46 - 51). Part of this diversity is due to the fact that the dunes lie at the margins of the natural distribution of several species, so that some species reach their northern limits and others their southern limits within Lancashire and its dunes. Such species are particularly sensitive to change. Further diversity is provided by a number of hybrids, several of which are extremely uncommon. The instability of the dunes brings together species that might not ordinarily meet and so provides extensive opportunity for hybridisation. This has given rise to a number of rare hybrids that the Fylde dune system shares with the richer hybrid flora found on the Sefton Coast.


dune helleborine

Many of the species and hybrids found in the Fylde Dunes are internationally significant, being endemic to the British Isles. Dune helleborine *Epipactis dunensis*, Isle of Man cabbage *Coincya monensis* subsp. *monensis*, purple ramping-fumitory *Fumaria purpurea* and the sub-species of early marsh orchid *Dactylorhiza incarnata* subsp. *cocinea* are all endemic to the British Isles along with the hybrid Baltic rush *Juncus balticus* x *J. inflexus* and the hybrid willow *Salix* x *angusensis* (common osier *S. viminalis* x grey willow *S. cinerea* x creeping willow *S. repens*). Dune helleborine, the Baltic rush hybrid and the hybrid willow are also nationally rare (occurring in no more than 15 10km squares in the UK) while purple ramping-fumitory, Isle of Man cabbage and the early marsh orchid sub-species are nationally scarce (occurring in no more than 100 10km squares in the UK. Purple ramping fumitory is additionally list as a Priority species for conservation in the UK Biodiversity Action Plan.


early marsh orchid

The most widespread of these species along the Coast is the Isle of Man cabbage; found throughout the more mobile dune areas from Lytham to the northern parts of the Local Nature Reserve. This species is especially frequent within the Local Nature Reserve, just to the north of St Anne's Pier and throughout the sand hills of Fairhaven. Dune helleborine and early marsh orchid are scattered within the dune-slacks of the Local Nature Reserve and Starr Hills Dunes to the north and south of the Thursby Nursing Home, though the former has a rather variable annual distribution while the latter is generally much more abundant.


Isle of Man cabbage

hybrid willow *S.* x *angusensis*

The Baltic rush hybrid occurs at the edge of the large slack in the south-west corner of the Local Nature Reserve. The nationally scarce parent Baltic rush *J. balticus* became locally extinct in 1968 following building of the tennis courts at King Edward School (but can still be found in the Sefton Dunes on the other side of the Ribble Estuary), though the more widespread hard rush *J. inflexus* is still scattered within the Local Nature Reserve. The hybrid willow *Salix* x *angusensis* was originally discovered on the east coast of Scotland but is now restricted to the north-west coast of England from the Wirral to south-west Cumbria. Within the Fylde Dunes, this hybrid occurs in the Starr Hills Dunes to the north of Thursby Nursing Home and on the Royal Lytham St Anne's golf course. Purple ramping fumitory was first recorded in the grounds of King Edward School in 2001 and relocated there in 2004 and 2005 growing with an abundance of common ramping-fumitory. No fumitories could be found in 2008 and the area where they had been present in 2005 was largely smothered by dumped grass cuttings. The seeds of purple ramping-fumitory are able to remain dormant for many years, so fresh disturbance in this area could see the reappearance of this plant.

Hybrid Baltic rush (left), photographed at Lytham St Anne's Local Nature Reserve, with the parent species Baltic rush (above left) photographed at Birkdale Green Beach, Sefton, and hard rush (above right) also at Lytham St Anne's LNR.

Ramping-fumitories at King Edward VII and Queen Mary School in June 2005 (above left) and a close up of purple ramping-fumitory at Southport (above right).

Two other hybrids present on the Fylde Dunes, *Centaurium* x *intermedium* (seaside centaury *C. littorale* x common centaury *C. erythraea*) and the hybrid willow *Salix* x *friesiana* (creeping willow x common osier) are both nationally rare, while seaside centaury, green-flowered helleborine *Epipactis phyllanthes*, variegated horsetail *Equisetum variegatum*, sticky stork's-bill *Erodium lebelii*, round-leaved winter-green *Pyrola rotundifolia* subsp. *maritima*, dune fescue *Vulpia fasciculata*, the hybrid willow *S* x *subsericea* (grey willow x creeping willow) and the hybrid dune fescue x *Festulpia hubbardii* (dune fescue x red fescue *Festuca rubra*) are all nationally scarce. Lax-flowered sea-lavender *Limonium humile*, which is found on the saltmarshes, is also nationally scarce.


dune fescue

Dune fescue is widely distributed in the mobile and semi-fixed dunes from Fairhaven to Squires Gate. It is most plentiful in the northern part of Starr Hills, in St Anne's Dunes between Bentnick Road and the North Promenade car park, and over much of the Fairhaven Dunes. Green-flowered helleborine and round-leaved wintergreen have a similar distribution to dune helleborine, being present in the dune-slacks of the Local Nature Reserve and either side of Thursby Nursing Home, with again variable annual abundance. Green-flowered helleborine tends to be less numerous than dune helleborine (certainly the case in 2008) while round-leaved wintergreen has a rather scattered distribution but can be quite numerous where it does occur. Seaside centaury has previously been recorded as common throughout the Local Nature Reserve, but this species appears to be in decline and in 2008 was noted only within the walled field of Thursby Nursing Home (Eric Greenwood pers. com.) and only very rarely within the Local Nature Reserve, with the common centaury being considerably more abundant in this area. Variegated horsetail is present at two locations; within the walled field next to Thursby Nursing Home and in a single slack within the Local Nature Reserve.


green-flowered helleborine


round-leaved wintergreen


variegated horsetail

Sticky stork's-bill has been recorded from the Local Nature Reserve and elsewhere on the coast, though it was not noted during 2008 survey work and reported only from Fairhaven. The hybrid centaury occurs within the walled field next to Thursby Nursing Home while the hybrid dune fescue has been found in the dunes of Fairhaven and St Anne's. The hybrid willow *S.* x *friesiana* occurs in the Local Nature Reserve, on Royal Lytham St Anne's golf course, by the railway line at St Anne's and in a dune-slack at Fairhaven, while *S.* x *subcericea* occurs on Starr Hills Dunes, just to the north of Thursby Nursing Home. Lax-flowered sea-lavender is found in the saltmarsh of Granny's Bay and the nearby accreting saltmarsh rather than within sand dune habitats.

Yellow bird's-nest *Monotropa hypopitys*, flat-sedge *Blysmus compressus* and prickly saltwort *Salsola kali* subsp. *kali* have all been identified as Priority species for conservation in the most recent revision of the *UK Biodiversity Action Plan*, with the former being listed as 'endangered' in the *Red Data Book* of vascular plants while the latter two are listed as 'vulnerable'. Hound's-tongue *Cynoglossum officinale*, round-fruited rush *Juncus compressus* and heath dog violet *Viola canina* are all listed as 'near threatened' in the *Red Data Book* of vascular plants. A good stand of flat-sedge occurs within slack vegetation at the southern end of Fairhaven Dunes. Yellow bird's-nest has been recorded regularly within the Lytham St Anne's Local Nature Reserve in previous years, though its abundance varies considerably from year to year and none were found in 2008. Prickly saltwort is scattered along the foredune at Starr Hills and Fairhaven. A few hound's-tongue plants are very thinly scattered within the Fairhaven Dunes while round-fruited rush also occurs at Fairhaven. Heath dog violet has been recorded in previous years from Starr Hills Dunes, the Local Nature Reserve, Fairhaven and the Lytham St Anne's Old Links golf course.


flat-sedge


prickly saltwort


hound's-tongue

Many more plant species of the Fylde Dunes are locally uncommon including sea spurge *Euphorbia paralias*, wild pansy *Viola tricolor* subsp. *curtisii* and sand cat's-tail *Phleum arenarium*, which are all widespread within the Fylde Dunes, together with the more locally distributed Portland spurge *Euphorbia portlandica* (classified as nationally scarce until recently), pyramidal orchid *Anacamptis pyramidalis*, southern marsh-orchid *Dactylorhiza praetermissa*, marsh helleborine *Epipactis palustris*, common broomrape *Orobanche minor*, yellow wort *Blackstonia perfoliata*, small-fruited yellow sedge *Carex viridula* subsp. *viridula*, grass-of-Parnassus *Parnassia palustris*, Ray's knotgrass *Polygonum oxyspermum* and lesser meadow-rue *Thalictricum minus*.


marsh helleborine


pyramidal orchid


common broomrape

While an excellent variety of vascular plants persists along the Fylde Coast, there are several notable species which have been lost in recent years or are currently in decline, primarily due to built development and fragmentation of the dunes. The loss of the nationally scarce Baltic rush is referred to above while the Priority *UK Biodiversity Action Plan* species field gentian *Gentianella campestris* was also lost to the same development. Other locally notable species lost in the last few decades include moonwort *Botrichium lunaria*, lesser centaury *Centaurium pulchellum*, sea bindweed *Calystegia soldanella*, slender spike-rush *Eleocharis uniglumis*, burnet rose *Rosa pimpinellifolia*, lesser clubmoss *Selaginella selaginoides* and a variety of common cornsalad *Valerianella locusta* subsp. *dunensis*.

Other species are currently in decline. These include the internationally important dune helleborine, which has recently been lost from the Fairhaven Dunes and Clifton Hospital site, and the nationally scarce variegated horsetail, which was fairly frequent on the Local Nature Reserve until a few years ago, as well as local notables; marsh helleborine which has almost gone from the Fairhaven Dunes, lesser meadow-rue which has been lost from Lytham and is now confined to a few sites at Fairhaven and Clifton Hospital, small-fruited yellow sedge, and grass-of-Parnassus which was lost from Fairhaven before 1964.

The bryophytes flora of the Fylde Dunes is generally poor compared to many other dune systems and this may be due to the considerable disturbance of the Fylde Dune system over the years.


small-fruited yellow sedge


grass of Parnassus

Fauna

Birds

Three species of bird which regularly breed within the Fylde Sand Dunes are listed as Priority species for conservation in the *UK Biodiversity Action Plan* and are also on the RSPB's Red List of species of conservation concern; these are reed bunting, skylark and linnet. All of these breed principally on the Local Nature Reserve; reed bunting breed around the dune slacks, up to 8 pairs of skylark have been recorded in the Reserve grasslands and linnet nest within clumps of marram on the Reserve. House sparrow and starling (both on the RSPB Red List and *UK BAP* Priority list) both utilise the dunes during the breeding season but probably nest nearby.

reed bunting at Lytham St Anne's LNR

One of the most conspicuous breeding birds on the dunes is the stonechat, which in 2008 nested in tall marram at Starr Hills and at Fairhaven. This species is on the RSPB's Amber List of species of conservation concern. Breeding birds within the scattered scrub at Fairhaven and the Local Nature Reserve include whitethroat and other warblers.

male stonechat at Starr Hills Dunes

stonechat family at Fairhaven

The saltmarsh and mud-flats of the Ribble Estuary are of international importance for their numbers and variety of wintering waterfowl including Bewick's swan, whooper swan, golden plover, bar-tailed godwit, ringed plover, sanderling, redshank, pink-footed goose, shelduck, wigeon, teal, pintail, oystercatcher, grey plover, knot, dunlin and black-tailed godwit. The accreting saltmarshes of the Fylde Coast, while not currently included in the SSSI, will contribute to the importance of the Ribble for these species.

Additional interest in winter on the Fylde Coast is provided by the occasional occurrence of snow bunting and, less frequently, shore lark feeding on seeds along the foredune and strandline. Twite are also occasional visitors but are more associated with the saltmarsh habitats.

Mammals

Two mammal species listed as Priority species for conservation in the *UK Biodiversity Action Plan* used to occur on the Fylde Dunes, but are now locally extinct. Brown hare was reportedly very common on the airport in the 1950s but this species was last seen on the Local Nature Reserve in 1995. Water vole used to be present on the Local Nature Reserve but this species is now extinct over most of the Fylde following a national decline in excess of 90% during the last century. Other mammal species recorded from the dunes over the years include common shrew, pygmy shrew, hedgehog, field vole, wood mouse, rabbit, stoat, weasel, fox and sika deer.

Reptiles and Amphibians

The Fylde Dunes support a population of common lizard, while common toad and smooth newt occur in the deeper slacks on the Local Nature Reserve. Common lizard and common toad are both recent additions to the list of Priority species for conservation in the *UK Biodiversity Action Plan*.

Some of the strongest colonies in Britain of natterjack toad (another *UK BAP* Priority species) occur in the sand dunes and saltmarshes of the Sefton and Cumbria coasts, but the species is absent from the Fylde Dunes; probably due mainly to a lack of suitable slacks for breeding and heavy public disturbance. An attempt was made in 1969 to introduce natterjack toads to the Local Nature Reserve and spawn was produced in 1970 but none were observed from 1971 onwards.

Invertebrates

The dunes provide habitat for a wide range of invertebrate species which are often specialists of dune habitats and unable to survive elsewhere. These include the British endemic sandhill rustic moth *Luperina nickerlii* subsp. *gueneei*, the nationally rare vernal colletes bee *Colletes cunicularius* and the nationally scarce spiders *Mecopisthes peussi* (a money spider), *Philodromus fallax* (a running crab-spider) and *Sitticus saltator* (a jumping spider).

A total of 31 moth species have been recorded on the Fylde Dunes which are either nationally rare, nationally scarce or listed as Priority species in the *UK Biodiversity Action Plan*. Perhaps most significant of these is the sand hill rustic sub-species which is confined to north Wales and north-west England. Its rarity seems to be the result of highly specialised habitat requirements where eggs are laid in late summer on sand couch-grass *Elytrigia juncea*, which provides the only food source for the caterpillars and with only plants lapped by the highest tides being chosen.

Other nationally rare, scarce or Priority *UK BAP* moth species recorded on the Fylde Dunes are the Portland moth *Actebia praecox*, sand dart *Agrostis ripae*, ear moth *Amphipoea oculea*, mouse moth *Amphipyra tragopoginis*, garden tiger *Arctia caja*, mottled rustic *Caradrina morpheus*, crescent *Celaena leucostigma*, latticed heath *Chiasmia clathrata*, small square-spot *Diarsia rubi*, dark tussock *Dicallomera fascelina*, coast dart *Euxoa cursoria*, garden dart *Euxoa nigricans*, ghost moth *Hepialus humuli*, rosy rustic *Hydraecia micacea*, ruddy highflyer *Hydriomena ruberata*, golden-rod brindle *Lithomoia solidaginis*, pale pinion *Lithophane social*, broom moth *Melanchra pisi*, rosy minor *Mesoligia literosa*, shore wainscot *Mythimna litoralis*, powdered quaker *Orthosia gracilis*, shaded broad-bar *Scotopteryx chenopodiata*, luner hornet moth *Sesia benbiciformis*, white colon *Sideridis albicolon*, white ermine *Spilosoma lubricipeda*, buff ermine *Spilosoma luteum*, hedge rustic *Tholera cespitis*, cinnabar *Tyria jacobaeae*, dark-barred twin-spot carpet *Xanthorhoe ferrugata* and sword-grass *Xylena exsoleta*. Of these, sand dart, coast dart, shore wainscot and Portland moth are specialist dune moths. The larval foodplants of sand dart, coast dart and Portland moth are various sandhill plants while the larval foodplant of shore wainscot is marram *Ammophila arenaria*. In addition, the larval foodplant of the cinnabar is common ragwort *Senecio jacobaea* which is a significant component of the semi-fixed dunes.

The vernal colletes is a mining bee confined to coastal sand dunes in north-west England and Wales which favours mobile and semi-fixed dunes, including old blow-outs. It requires areas of exposed sand in which to dig its burrows along with a supply of creeping willow for foraging.

The money spider *Mecopisthes peussi* is very localised, with all post-1992 records being from western sand dunes, from central Wales to Walney Island plus one recent Scottish record from Galloway. The most recent record from Lancashire is an adult male collected from the Lytham St Annes Dunes and it is also known from Fairhaven and the Sefton Dunes. The running crab spider *Philodromus fallax* is a southern coastal species which was found in 1993 on the Lytham outer dunes. This spider is camouflaged for open sand and its egg sacs are deposited in the sand at the base of marram. The jumping spider *Sitticus saltator* is primarily found from Drigg and the Isle of Man round to the Norfolk coast in open coastal sand. *M. peussi* and *P. fallax* are both recent additions to the list of Priority species for conservation in the *UK Biodiversity Action Plan.*

Other spiders of interest include the nationally scarce wolf spider *Alopecosa cuneata* (found in unimproved grassland and dune, primarily scattered over the southern half of Britain) and ground spider *Zelotes electus* (found at the base of low vegetation on dunes, scattered principally around the coast from Drigg Dunes in Cumbria to the eastern Scottish coast with two recent Fylde records). *Arctosa perita,* and *Xerolycosa miniata* are wolf spiders which are restricted to sandy habitats but can be more widespread in suitable habitat. *A. perita* favours frontal dunes but is also found inland in open sandy habitats, while *X. miniata* is confined to coastal areas where it is found on fixed dunes with sparse vegetation, especially restharrow. The foliage spider *Clubiona subtilis*, recently found in the Fairhaven Dunes, is very rare in the north of Britain but is more common in the fens and marshes of south-east England. Interestingly, *Alopecosa cuneata* and *Clubiona subtilis* have not been found on the more extensive and generally better recorded Sefton Dunes.

Other nationally scarce invertebrates recorded from the Fylde Dunes are the weevil *Cleonus piger*, the beetle *Notoxus monocerus* and the cranefly *Nephtotoma submaculosa*.


grayling, Lytham St Anne's LNR


wall brown, Lancashire


small heath, Starr Hills Dunes

Amongst the most conspicuous invertebrates on the Fylde Dunes are the butterflies which include the *UK BAP* Priority butterflies; small heath *Coenonympha pamphilus*, grayling *Hipparchia semele* and wall brown *Lasiommata megera*. Grasses provide the larval foodplant for all three of these species. The populations of grayling on the Fylde Dunes are currently the strongest in the county following a recent decline in numbers of this species in its other local stronghold on the limestone pavements and associated habitats in north Lancashire. Conversely, the wall brown may only occur in small numbers on the dunes and the population appears to be in steep decline throughout Lancashire.

Other butterfly species found on the Fylde Dunes include common blue *Polyommatus icarus,* meadow brown *Maniola jurtina* and gatekeeper *Pyronia tithonus*, which are all found widely throughout the dunes, while holly blue *Celastrina argiolus*, small copper *Lycaena phlaeas*, large skipper *Ochlodes venata* and small skipper *Thymelicus sylvestris* also occur.

Euchlora dubia chafer, Starr Hills Dunes

Another conspicuous invertebrate, which is of local interest and easily seen in the mobile dunes along the Fylde Coast during early summer, is the large chafer *Euchlora dubia*. This species needs areas of bare sand in which to burrow and is particularly common on the Starr Hills Dunes.

Communities

The vegetation communities of the Fylde coastal dunes have been mapped in 1989 and in 2002 (Nissenbaum 1989 and University of Liverpool Environmental Research & Consultancy 2002). These surveys recorded the presence of the following dune communities:-

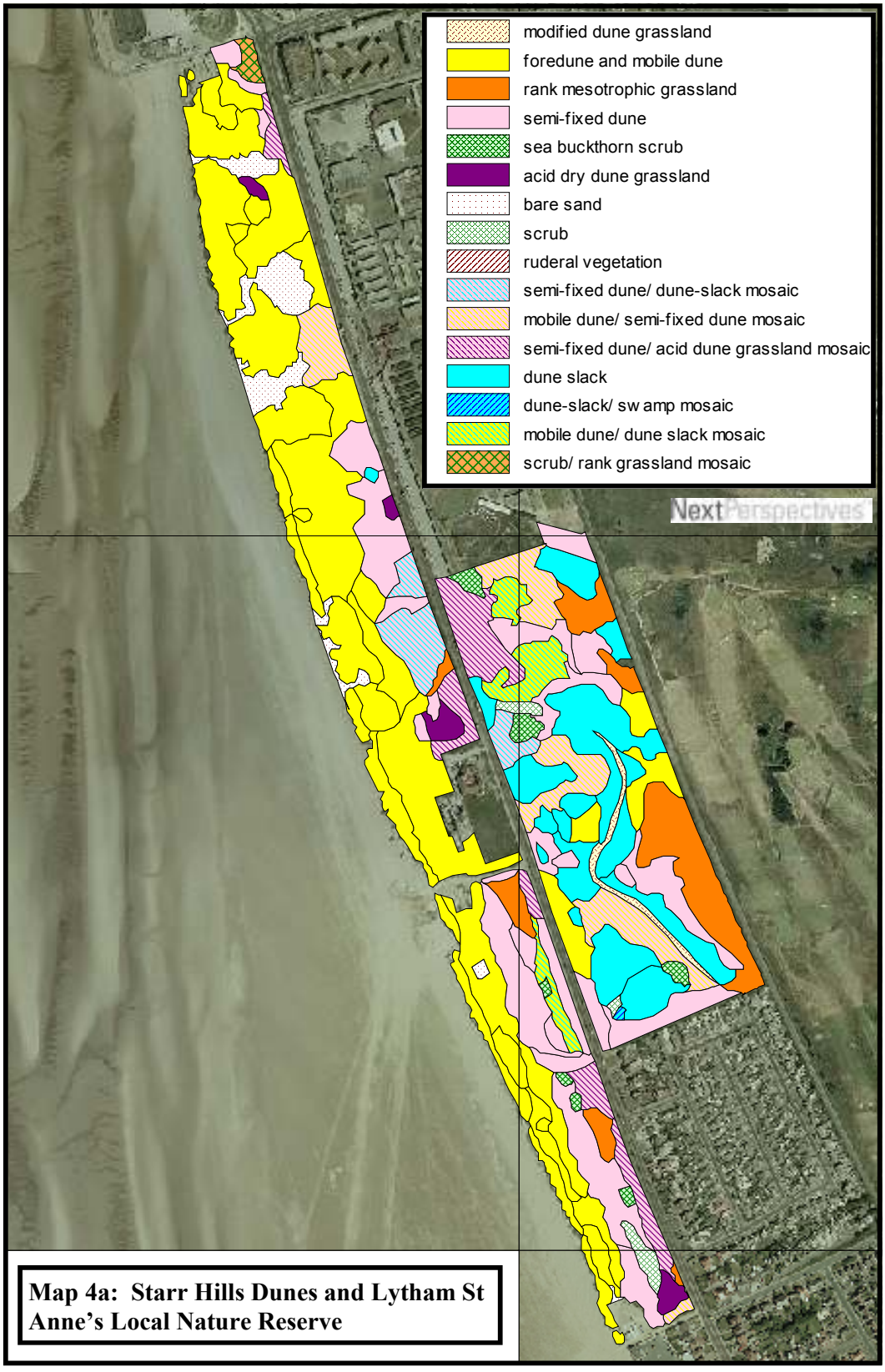
- SD5 *Leymus arenarius* mobile dune community
- SD6 *Ammophila arenaria* mobile dune community
- SD7 *Ammophila arenaria - Festuca rubra* semi-fixed dune community
- SD8 *Festuca rubra - Galium verum fixed* dune grassland
- SD9 *Ammophila arenaria - Arrhenatherum elatius* dune grassland
- SD10 *Carex arenaria* dune community
- SD11 *Carex arenaria - Cornicularia aculeata* dune community
- SD15 *Salix repens - Calliergon cuspidatum* dune-slack community
- SD16 *Salix repens - Holcus lanatus* dune-slack community
- SD18 *Hippophae rhamnoides* dune scrub

Non-dune communities recorded included MC9 *Festuca rubra - Holcus lanatus* cliff-ledge community, MG1 *Arrhenatherum elatius* grassland and OV23 *Lolium perenne - Dactylis glomerata* community. The distribution of broad vegetation types found in the 2002 survey is shown on Map 4.

No formal NVC survey was undertaken during 2008, but observations whilst compiling data for this report suggested that scattered stands of pioneer dune observed along the dune front were likely to be SD2 *Honkenya peploides - Cakile maritima* strandline community or SD4 *Elymus farctus* ssp. *boreali-atlanticus* foredune community, while the accreting saltmarsh between St Anne's and Lytham included SM6 *Spartina anglica* saltmarsh community, SM13 *Puccinellia maritima* saltmarsh community and S21 *Scirpus maritimus* swamp.

Other vegetation types observed within the Fylde Dunes include SD19 *Phleum arenarium - Arenaria serpyllifolia* dune annual community, noted on open vegetation of fixed dunes early in the year with a number of characteristic early flowering species present, and a significant patch of H11 *Calluna vulgaris - Carex arenaria* heath (*Empetrum nigrum* or species poor sub communities) occurs on the Old Links golf course. Patches of brown sedge *Carex disticha* are present on the Local Nature Reserve but these do not seem to be recognised by the NVC scheme.

Map 4: Habitats present within the Fylde coastal dune area in 2002
(adapted from University of Liverpool Environmental Research & Consultancy, 2002)




modified dune grassland
foredune and mobile dune
rank mesotrophic grassland
semi-fixed dune
sea buckthorn scrub
acid dry dune grassland
bare sand
scrub
ruderal vegetation
semi-fixed dune/ dune-slack mosaic
mobile dune/ semi-fixed dune mosaic
semi-fixed dune/ acid dune grassland mosaic
dune slack
dune-slack/ sw amp mosaic
mobile dune/ dune slack mosaic
scrub/ rank grassland mosaic
Map 4b: St Anne's Dunes
NextPerspectives


Map 4c: Fairhaven Dunes
modified dune grassland
foredune and mobile dune
rank mesotrophic grassland
semi-fixed dune
sea buckthorn scrub
acid dry dune grassland
bare sand
scrub
ruderal vegetation
semi-fixed dune/ dune-slack mosaic
mobile dune/ semi-fixed dune mosaic
semi-fixed dune/ acid dune grassland mosaic
dune slack
dune-slack/ sw amp mosaic
mobile dune/ dune slack mosaic
scrub/ rank grassland mosaic
Next Perspectives


NextPerspectives
modified dune grassland
foredune and mobile dune
rank mesotrophic grassland
semi-fixed dune
sea buckthorn scrub
acid dry dune grassland
bare sand
scrub
ruderal vegetation
semi-fixed dune/ dune-slack mosaic
mobile dune/ semi-fixed dune mosaic
semi-fixed dune/ acid dune grassland mosaic
dune slack
dune-slack/ sw amp mosaic
mobile dune/ dune slack mosaic
scrub/ rank grassland mosaic
Map 4d: Lytham Dunes

2.6.3 Cultural Features

Landscape Character
Much of the Fylde Coast retains a distinctive and natural landscape with open views across the sea. The undulating dunes and mosaics of dune-grassland vegetation and bare sand provide an attractive landscape which is enhanced in the summer by colourful displays of dune flowers and in the autumn and winter by the conspicuous birdlife along the shoreline. Looking inland, however, it is hard to ignore the built developments which surround the dunes, with Blackpool Tower and Pleasure Beach being prominent features to the north, while to the east the view is mostly of residential housing.

The Fylde Coast lies within the Joint Character Area JCA 032: Lancashire and Amounderness Plain. This is a generally flat or gently rolling landscape running from Morecambe Bay in the north to Liverpool in the south, bounded by the Bowland Fells to the east and bisected by the Ribble Estuary. Large parts of this area are characterised by medium-sized fields of lush dairy pasture to the north of the Ribble and an open, mainly arable landscape to the south. The most distinctive coastal features of this area are the saltmarshes and intertidal flats of the Ribble and Wyre estuaries. The narrow band of remnant dune along the Fylde Coast is currently less characteristic of the region's coastline although this habitat would once have been a far more important element of the coastal landscape; stretching from the northern edge of the Ribble along the whole coast up to the western edge of the Wyre and interrupted only by boulder clay cliffs at Blackpool, Norbreck and Bispham.

Archaeological and Historical Features
There are no known designated archaeological or historical features within the coastal habitats although the St Anne's Promenade gardens to the rear of the Pleasure Island complex are classified by Fylde Borough Council as 'historic gardens' for the purposes of local planning.

Within the Local Nature Reserve, the remains of World War II structures are present. These are likely to hold some historic value and are the tangible remains of the massive wartime disturbances which gave rise to the main slack at the southern end of the Reserve

Land-Use History
Historically, the dunes have been seriously under-appreciated and have mostly been subjected to exploitation or neglect. Until as recently as 1994, the area of coastal dune has been eroded by various large- and small-scale built developments, while the dunes themselves have been subjected to re-profiling in an attempt to reduce the volumes of wind-blown sand onto the adjacent highways and properties or to create areas for more formal amenity use. As stated above, the Local Nature Reserve underwent substantial disturbance as part of the areas coastal wartime defence and this area has also been subjected to sand winning during the intervening years. The primary utilisation of the remaining coastal dunes has been for informal recreation and as a storage base for more organised water sports on the beach and sea.

In recent years there has been an increasing acknowledgement of the dune's importance for nature conservation and as a highly efficient and cost-effective contingent within the Borough's sea-defence. The Local Nature Reserve was opened in 1968, the Local Nature Reserve and the adjacent area of Starr Hills Dunes was declared a national Site of Special Scientific Interest in 1991, most of the remaining dune and saltmarsh habitats were designated as county Biological Heritage Sites in 1997 and these habitats are currently protected from most forms of development by the *Fylde Borough Local Plan*. However, very little management work has been carried out to benefit the nature conservation value of the site. Up until 2002, the Local Nature Reserve wardens carried out some small-scale management works, while elsewhere occasional conservation management has been

carried out including some control of sea buckthorn growth and thatching of eroded dune by the British Trust for Conservation Volunteers. However, there has been no coordinated effort to improve the wildlife value of the dunes and a number of current management activities, most notably mechanical beach cleaning along the toe of the dunes, are actually damaging to dune development.

Socio-economic Use
The dunes and other natural coastal habitats provide a vital and highly cost-effective flood-defence. The potential value of the dunes for tourism has not been exploited. In the past, this value has been overlooked, with tourism efforts being aimed at sporting use of the beach or more commercial activities in the developed seafront areas at St Anne's and Fairhaven. The dunes have simply been used to support such tourism by providing a location for, for example, sports storage compounds.

With the rise of ecotourism in recent decades, there is a huge potential to promote the outstanding nature conservation value of the dunes, saltmarsh and adjacent sand flats for day-visits and longer holidays, which could potentially generate significant income for the local economy.

Education and Research Use
Again the Fylde Dunes are a significantly under-developed resource for research and education. An MSc thesis was produced on the dune vegetation and management in 1989 (Nissenbaum 1989) but otherwise no formal research has been undertaken within the Fylde Dunes. A significant amount of recording and monitoring of the Local Nature Reserve wildlife was undertaken by the site wardens between 1968 and 2002 and important collection of natural history records continues to be carried out on a casual basis by local amateur naturalists. The Local Nature Reserve wardens also provided a source of public information and education which has not been available since 2002.

The recent appointment of a Dune Project Officer should begin to realise some of the site's potential for education. Working in collaboration with local educational establishments there is also much scope for development of research projects, including research into coastal and dune dynamics, the impact of management techniques and species behaviour and conservation.

2.6.4 Access Features

Visitor Appeal and Suitability for Access
There is very clearly much of interest for visiting naturalists, given the general wealth of wildlife and the scarcity of many of the species present elsewhere in Britain, while the colourful displays of wildflowers and the sense of wilderness provided by one of the few natural British habitats is appealing for casual walkers or for those simply passing through to the beach. The dunes are also well used by dog-walkers, particularly in the flatter and less mobile areas.

There is easy access from the adjacent roadside to most of the dunes, though access is more limited to the northern dunes, where the Local Nature Reserve and SSSI lie, with just one car park by the Coastguard Station and restricted roadside parking on a very busy main road.

Access Provision

Access to most of the coastal dunes and the Local Nature Reserve is unrestricted, from Clifton Drive North, North Promenade, South Promenade and Inner Promenade. Unrestricted car parking is available on the roadside along part of North Promenade and the Inner Promenade and restricted roadside parking is available on Clifton Drive North, North Promenade and South Promenade. Free parking is also available at the North Beach car park (on Clifton Drive North, next to the Coastguard Station), while pay-and-display car parks are available at St Anne's Pier (North Promenade), opposite Fairhaven Road (South Promenade) and Fairhaven Lake (Inner Promenade).

Visitor Facilities

There are currently no formal visitor facilities specifically associated with the sand dunes of the Fylde Coast, although extensive tourist facilities are present at St Anne's sea front, St Anne's Pier, the Pleasure Island complex and the Fairhaven Lake complex, including a Royal Society for the Protection of Birds (RSPB) shop at the latter site.

A small cabin is present on the Local Nature Reserve which used to be manned and served as a visitor centre until 2002, but this has been unused since that time. This building is not ideally located as a visitor centre; being in one of the more difficult parts of the dunes to access due to limited nearby parking and the difficulty of crossing the very busy road from the main coastal dune areas. Re-establishment of this building as a visitor centre thus has very limited potential because it is unsuitable for school parties or for drawing in casual visitors, and is only likely to attract people who are already interested in the dunes and make a specific effort to visit. It would be desirable to establish a visitor centre in the northern part of the dunes (i.e. near to the SSSI and the Local Nature Reserve) with sufficient parking for school buses which would be attractive to local people and a wide range of the region's visitors.

'visitor centre' at Lytham St Anne's LNR

2.7 Flood Defence

Sand dunes can be a highly effective form of flood defence. During storm conditions, sand dunes release sand which slows the rate of beach scouring. This limits the wave energy and therefore slows down the rate of frontal dune erosion. During subsequent periods of fine weather, waves then transport sand back onto the beach and wind-borne sediment from the beach rebuilds the frontal dunes. The dune frontage therefore provides a naturally dynamic sea defence which requires little or no capital investment and subsequent maintenance. By contrast, a severe storm could cause lowering of the beach in front of an artificial defence to the point where it is undermined resulting in breaching of the defence.

The most important attributes of coastal dunes in terms of flood defence are the crest elevation above sea-level, the shape of the dunes and the dune width. Dune systems which have the greatest flood-defence value are both wide and high. A relatively narrow dune system (30 - 40 m wide) can have a high flood defence value if the dunes are above 10 m height, though such a system is at significant risk from erosion; on exposed sections of coast, 10 m or more of dune can be eroded during a single severe storm. Dune systems less than 5 m wide or less than 2 m high are considered to have no flood defence value. The linear integrity of dune systems is also important and continuous dune ridges provide the greatest flood defence value. Blow-outs and other low or narrow points in the crest are potential weak-points, depending on the presence or condition of any landward dunes. The degree of vegetation cover on dunes is also an important attribute affecting flood defence since it influences dune resistance to both wind and marine erosion.

Saltmarsh is also a very effective form of flood defence due to its ability to absorb wave action. Research has shown an almost linear relationship between the width of salt marsh and the necessary rear sea-wall height required to prevent flooding. If the area of saltmarsh is large enough, it can remove all of the energy of the wave under certain conditions.

While they remain in their current extent and condition, the dunes and saltmarsh of the Fylde Coast therefore form a perfectly serviceable coastal flood-defence under current coastal conditions, and are more efficient and considerably more cost-effective than the hard-engineering alternatives. The most recent Environment Agency *Flood Risk* map appears to show vulnerability to flooding only at North Beach Car Park, with a less than 1 in 200 annual probability. However, because the width of the dunes has been depleted so greatly by built development and because seaward accretion is inhibited by man-induced activities, the dunes are extremely vulnerable to erosion during sustained storms or from future changes in sea-level or coastal dynamics, which could severely compromise the dune's flood-defence properties. This situation is particularly acute along the entire length of the St Anne's dunes from the disused sand yachting compound in the north to St Anne's Pier in the south, while physical breaches in the dune (such as the access road for sand winning) are also vulnerable.

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3 EVALUATION AND OBJECTIVES

3.1 Evaluation of features

Size
The coastal dunes and Local Nature Reserve cover a total of 69 ha, including degraded and heavily eroded dune. Inland, a further 100 ha includes remnant dune habitat; principally within the two golf courses where this area includes extensive areas of fairway and semi-rough. This is a tiny fragment of what should naturally occur, with estimated dune-coverage of 505ha in this area in 1839 prior to the expansion of Blackpool and the building of St Anne's from 1875 onwards (see Map 1). The fact that the remnant area of dunes in Fylde Borough represents just under 1% of the total sand dune resource in England is a measure of how scarce sand dune habitat is in England today.

In Britain as a whole, the Fylde Dunes is one of the smaller dune systems. The largest dune system in Britain is 3,100 ha at Culbin Sands in Morayshire. Six systems are over 1,200 ha (including the Sefton Dunes on the southern side of the Ribble Estuary), twenty are between 400 and 1,200 and just over 100 are between 40 and 400 ha (Brooks & Agate 1996).

Most critically, the current band of Fylde coastal dunes is extremely narrow, which means that its function as a coastal defence is compromised and natural development along the coast of the various stages of a dune system (from embryo dunes at the seaward edge through mobile and semi-fixed dune hills and ridges to fixed dune grassland at the landward side, together with scattered dune slacks in damp areas) is severely limited. The dunes are further fragmented, even along the coastal strip, by various built developments and compounds including car parks, utility constructions, sports-club storage areas and the more substantial developments around St Anne's Pier and Fairhaven Lake.

Diversity
Despite restrictions to size and natural development, a reasonable diversity of dune habitats persists, with representatives of the key stages of dune development present at least somewhere along the coast. Additional diversity in coastal habitat is provided by the areas of scrub (some of which is desirable for breeding and resting migratory birds but some of which is encroaching significantly at the expense of natural dune habitat), the band of saltmarsh which is accreting from Lytham towards St Anne's together with the more mature marsh at Granny's Bay, and the band of shingle at Fairhaven between the dune toe and the accreting saltmarsh.

The dunes support a particularly diverse range of vascular plants and of butterflies and moths. Over 280 vascular plant species have been recorded and over 230 species of butterflies and moth.

Naturalness
Sand dunes are, potentially, amongst the most natural habitats to be found in Britain and the Fylde Dunes include most of the natural range of vegetation types one would expect to find in a natural dune system. However, the Fylde Dunes are unnaturally narrow and fragmented, resulting in there being very few places where the full range of natural dune development is able to occur. Within the Fylde coastal dunes, natural dune development is hindered by

- erosion of pioneer dunes by public use and mechanical beach cleaning activities,
- erosion of mobile and semi-fixed dunes by public use especially around frequently used access points,
- installation of hard sea defences at the northern end of the St Anne's Dunes and at Lytham,
- small-scale developments almost throughout the length of the coastal dunes and the more

substantial developments around the Pleasure Island complex and Fairhaven Lake, and
- inappropriate management of fixed dune grasslands as amenity grassland including frequent mowing and compaction of the soil.

Rarity

Dune, saltmarsh and coastal shingle are all rare habitats in Britain, being restricted to undeveloped sections of coast where appropriate physical and climatic conditions occur. All three are listed on Annex 1 of the EC Habitats Directive and are listed as Priority habitats for conservation in the U*K Biodiversity Action Plan*. The dune heath, which occurs on the St Anne's Old Links golf course, is a particularly uncommon habitat and this habitat, along with fixed dune grassland, is considered a priority habitat in Europe.

Of the vascular plants which occur on the Fylde coast, the populations of dune helleborine *Epipactis dunensis*, Isle of Man cabbage *Coincya monensis* subsp. *monensis*, purple ramping-fumitory *Fumaria purpurea*, the sub-species of early marsh orchid *Dactylorhiza incarnata* subsp. *cocinea,* the hybrid Baltic rush *Juncus balticus* x *J. inflexus* and the hybrid willow *Salix* x *angusensis* are all internationally significant, being endemic to the British Isles.

The seaside centaury hybrid *Centaurium* x *intermedium* and the hybrid willow *Salix* x *friesiana* are both nationally rare, while seaside centaury *Centaurium littorale*, green-flowered helleborine *Epipactis phyllanthes*, variegated horsetail *Equisetum variegatum*, sticky stork's-bill *Erodium lebelii*, round-leaved winter-green *Pyrola rotundifolia* subsp. *maritima*, dune fescue *Vulpia fasciculata*, the hybrid willow *S* x *subsericea* and the hybrid dune fescue x *Festulpia hubbardii* are all nationally scarce. Lax-flowered sea-lavender *Limonium humile*, which is found on the saltmarshes, is also nationally scarce.

Yellow bird's-nest *Monotropa hypopitys*, flat-sedge *Blysmus compressus* and prickly saltwort *Solsola kali* subsp. *kali* have all been identified as Priority species for conservation in the *UK Biodiversity Action Plan*, with the former being listed as 'endangered' in the *Red Data Book* of vascular plants while the latter two are listed as 'vulnerable'. Hound's-tongue *Cynoglossum officinale*, round-fruited rush *Juncus compressus* and heath dog violet *Viola canina* are all listed as 'near threatened' in the *Red Data Book* of vascular plants.

Rare invertebrate species recorded from the dunes include the nationally rare vernal colletes bee *Colletes cunicularius* and the nationally scarce weevil *Cleonus piger*, beetle *Notoxus monocerus,* cranefly *Nephtotoma submaculosa* and spiders *Philodromus fallax*, *Mecopisthes peussi*, *Sitticus saltator, Alopecosa cuneata, Xerolycosa miniata* and *Zelotes electtus*. In addition, a total of 31 moth species have been recorded on the Fylde Dunes which are either nationally rare, nationally scarce or listed as Priority species in the *UK Biodiversity Action Plan*. Most significant of these is the sand hill rustic sub-species *Luperina nickerlii* subsp. *gueneei* which is confined to north Wales and north-west England. The butterflies small heath *Coenonympha pamphilus*, grayling *Hipparchia semele* and wall brown *Lasiommata megera* are also listed as Priority species in the *UK Biodiversity Action Plan*.

Reed bunting, skylark and linnet all breed regularly within the Fylde Sand Dunes and are listed as Priority species for conservation in the *UK Biodiversity Action Plan* as well as being on the RSPB's Red List of species of conservation concern. Stonechat is on the Amber List of species of conservation concern. The saltmarsh and mud-flats of the Ribble Estuary are of international importance for their numbers and variety of wintering waterfowl and the accreting saltmarshes of the Fylde Coast will contribute to the importance of the Ribble for these species.

Populations of the herptiles common lizard and common toad occur within parts of the Fylde Dunes; both of which are listed as Priority species for conservation in the *UK Biodiversity Action Plan*.

Fragility
The dunes are vulnerable to further man-induced erosion which is currently preventing establishment of pioneer dunes at the seaward edge and also causing excessive loss of vegetation within heavily used areas of the existing dune system. The dunes are also vulnerable to pressures for continued development, with, for example, redevelopment of the former Blackburn Home site taking place as recently as 2003 and current proposals for the possible redevelopment of the disused sand yachting compound. Development not only causes direct loss of land but can also restrict movement of sand and also cause alteration to the water table which can lead to loss of dune-slack habitat. While the dunes and other natural coastal habitats should be safe from most forms of new built development, it is necessary to view redevelopment of existing structures within the dune system and any development adjacent to the dunes with extreme scrutiny to ensure that there is no further impact on the already heavily depleted dune resource. Recreational uses of the beach do not directly impinge upon the dunes but pressure exists in the form of storage facilities for sporting equipment being sited on the dunes and access routes across the dunes causing direct loss or erosion of dune habitats.

The dunes and saltmarsh along the Fylde Coast are currently in a natural state of accretion (although this is not always being allowed to take place due to the man-induced erosion referred to above). However, this will not always be the case due to the natural changing coastal dynamics of the Ribble Estuary which has significantly altered the coastline over the centuries or due to possible man-made developments offshore or elsewhere along the shoreline which may alter the channel patterns. Thus, at some time in the future, the Fylde Coast could by subject to natural coastal erosion. Given the present narrow nature of the dunes, this could result in very significant loss of habitat with associated flood risk to coastal properties. This process could be exacerbated with Climate Change causing rising sea-levels in the future.

Typicalness
The formation of sand dune habitat is the typical vegetation development in locations such as the Fylde Coast where appropriate conditions occur of: a supply of sand over a wide, drying foreshore, a backshore area of low relief, and predominant onshore winds for at least part of the year. Where natural dune development has been unhindered by man-induced erosion or fragmentation caused by artificial structures, the Fylde Dunes include a good range of typical dune habitats and species. Unfortunately, development and fragmentation of sand dune areas for housing, transport links and recreation has also been a common fate of many dune systems, with the creation of golf courses being a very frequent development.

Recorded History
Between 1968 and 2002, a valuable record of management works and natural history observations for the Local Nature Reserve and adjacent areas of dune was maintained by successive Reserve wardens. Mapping of vegetation communities within the entire coastal dune area was carried out by a post-graduate student in 1989 and by a consultancy company in 2002. The dunes have been reasonably well covered by amateur naturalists in recent decades with fairly comprehensive species lists available for many taxa.

Some historical information is recorded in the Local Nature Reserve site file, including old photographs and press-cuttings, while brief details regarding construction of some of the artificial structures in the dunes is provided in the 2005 management plan. A history of St Anne's town has

recently been published (Shakeshaft 2008).

The historical evolution of the coast line can be followed by reference to historical maps and surveys. The earliest maps of Lancashire date from 1577 while the first series of Ordnance Survey Maps appeared in the middle of the 19th Century and these have been updated at intervals subsequently. Further supplementary map information since the start of the 19th Century has been provided by surveyors carrying out work in the Ribble Estuary to aid navigation.

Position in Ecological/Geographical Unit

The Fylde Dunes are a relict of what was once a considerably more extensive dune system which stretched more-or-less continuously along the Lancashire coast from Lytham in the south to the Wyre Estuary in the north. In 2001, the total area of dune habitat remaining in Lancashire was estimated to be 88.7 ha; of which 79.8 ha was in Fylde Borough, 8.5 ha in Wyre (around the Fleetwood coast towards Cleveleys; particularly around Rossall Point) and a tiny (0.4 ha) dune remnant at Pott's Corner, Middleton Sands, north of the Lune Estuary in Lancaster. The Fylde dune system thus represents the most significant area of dune in Lancashire.

In a wider context, the Fylde Dunes compliment the more extensive dune system along the Sefton Coast on the other side of the Ribble Estuary. To the north, there are no significant areas of dune habitat until the dunes of south-west Cumbria at Walney Island and Sandscale Haws. In fact, about one third of England's sand dunes occur in north-west England, with those at Sefton, Walney and Sandscale, together with the Drigg Dunes in Cumbria, being internationally significant.

extensive dune habitat at Ainsdale on the Sefton Coast, August 2008

extensive saltmarsh on the south side of the Ribble Estuary, February 2008

Saltmarsh is also a characteristic coastal feature of north-west England, with extensive and internationally significant examples being associated with the Mersey Estuary, the Ribble Estuary, Morecambe Bay and the Solway Firth. The accreting saltmarsh at Fairhaven and Lytham links to the internationally important saltmarsh habitat within the Ribble Estuary SPA and SSSI.

Potential

There is potential to increase the area of dune habitat by

- encouraging natural accretion in areas where this is limited by man-induced erosion,
- artificial trapping of sand at key locations where the width of dune is very thin, and
- reclamation of areas occupied by man-made structures for dune restoration whenever such opportunities arise.

Broadening the dunes will also enhance the dune's effectiveness as the key part of the coast's sea defence.

There is potential to increase the nature conservation value of the sand dunes by

- controlled mowing or grazing of areas of rank vegetation within the fixed dune grasslands,
- encouraging stabilisation of excessively eroding dunes in areas of heavy public use,
- encouraging vegetation development along the band of shingle at Fairhaven,
- creation of new dune slacks by scraping off top-soil down to the water-table in areas which are currently species-poor,
- control of scrub, particularly sea buckthorn and white poplar, where this is spreading onto dune habitats and does not have significant value for breeding and migratory birds,
- eradication of the non-native and highly invasive Japanese knotweed from locations at Fairhaven, and
- applying more sympathetic management to amenity areas within the dune system.

Enormous opportunity exists to promote education and public understanding of the significance of the dunes and other coastal habitats, both for wildlife and as the major component of the coast's sea defence. A strategically sited and fully staffed visitor centre could prove a major amenity for both locals and visitors to the coast, generating income for the local economy, and could also provide a base for management works on the coast.

Intrinsic Appeal

Sand dune, saltmarsh and coastal shingle are, potentially at least, amongst the few truly natural habitats remaining in Britain. The sand dunes, particularly where they form part of the coastal habitats, have a natural wilderness feel to them and hold considerable attraction for a wide group of users including naturalists, walkers and family groups. The dunes and saltmarsh are also a highly significant component of the coast's sea defence.

3.2 Summary of Important Nature Conservation Features

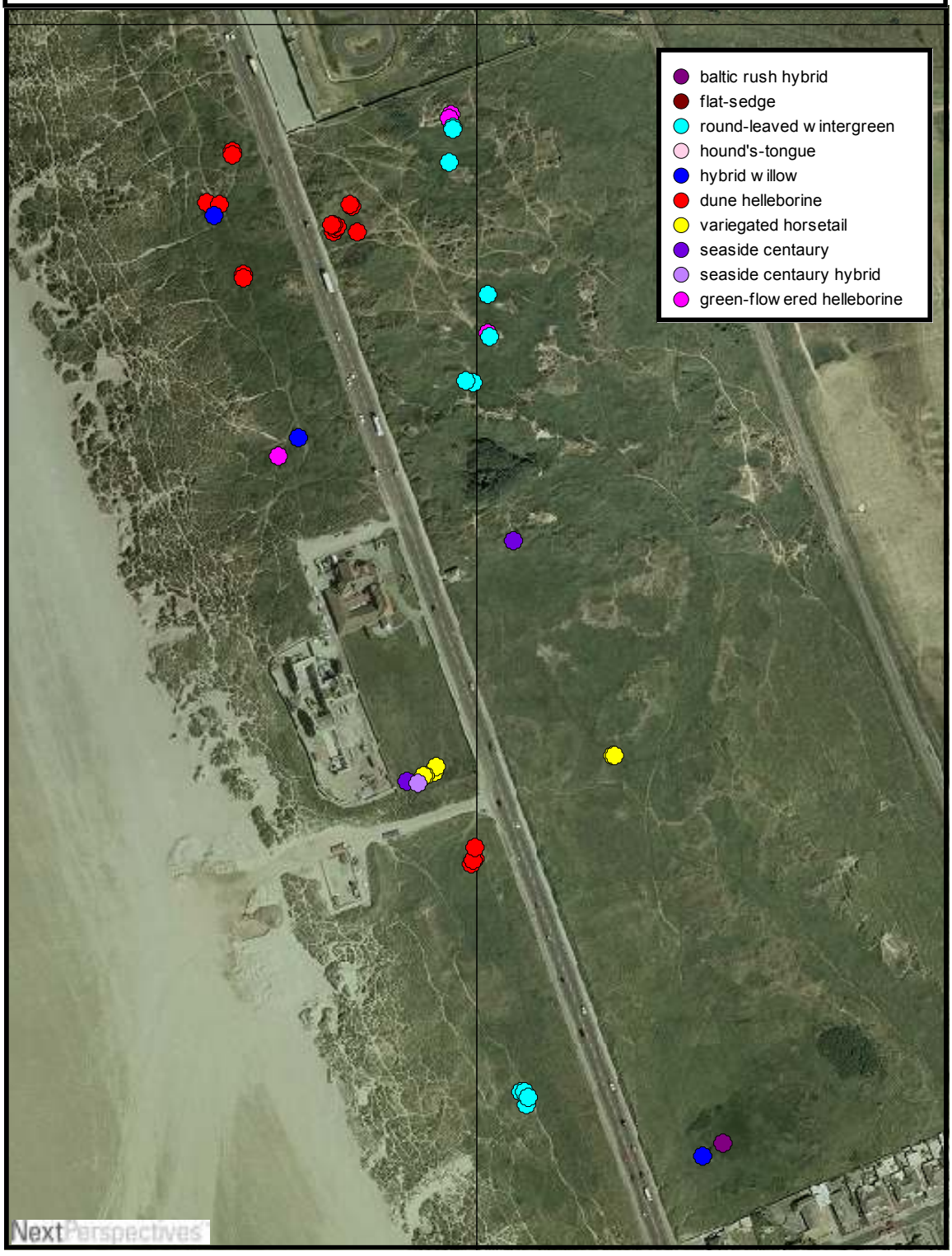
Feature	Status
1. Habitat	
Coastal sand dune (including dune heath)	UK BAP Priority habitat
Coastal vegetated shingle	UK BAP Priority habitat
Coastal saltmarsh	UK BAP Priority habitat
2. Species	
Vascular plants	
Epipactis dunensis dune helleborine	Internationally rare (endemic to the British Isles); Nationally rare
Juncus balticus x *J. inflexus* Baltic rush hybrid	Internationally rare (endemic to the British Isles) ; Nationally rare
Salix x *angusensis* hybrid willow	Internationally rare (endemic to the British Isles) ; Nationally rare
Fumaria purpurea purple ramping-fumitory	Internationally rare (endemic to the British Isles); Nationally scarce; UK BAP Priority species
Coincya monensis subsp. *monensis* Isle of Man cabbage	Internationally rare (endemic to the British Isles); Nationally scarce
Dactylorhiza incarnata subsp. *cocinea* early marsh orchid	Internationally rare (endemic to the British Isles); Nationally scarce
Centaurium x *intermedium* seaside centaury hybrid	Nationally rare
Salix x *friesiana* hybrid willow	Nationally rare
Centaurium littorale seaside centaury	Nationally scarce
Epipactis phyllanthes green-flowered helleborine	Nationally scarce
Equisetum variegatum variegated horsetail	Nationally scarce
Erodium lebelii sticky stork's-bill	Nationally scarce
Limonium humile lax-flowered sea-lavender	Nationally scarce
Pyrola rotundifolia subsp. *maritima* round-leaved wintergreen	Nationally scarce
Vulpia fasciculata dune fescue	Nationally scarce
Salix x *subsericea* hybrid willow	Nationally scarce
x *Festulpia hubbardii* dune fescue x red fescue hybrid	Nationally scarce
Monotropa hypopitys yellow bird's-nest	UK BAP Priority species; RDB 'endangered'
Blysmus compressus flat-sedge	UK BAP Priority species; RDB 'vulnerable'
Salsola kali subsp. *kali* prickly saltwort	UK BAP Priority species; RDB 'vulnerable'
Cynoglossum officinale hound's-tongue	RDB 'near threatened'
Juncus compressus round-fruited rush	RDB 'near threatened'
Viola canina heath dog violet	RDB 'near threatened'
Spiders	
Philodromus fallax a running crab-spider	Nationally scarce; UK BAP Priority species
Mecopisthes peussi a money spider	Nationally scarce; UK BAP Priority species
Sitticus saltator a jumping spider	Nationally scarce
Alopecosa cuneata a wolf spider	Nationally scarce
Xerolycosa miniata a wolf spider	Nationally scarce
Zelotes electus a ground spider	Nationally scarce

Bees	
Colletes cunicularius vernal colletes bee	Nationally rare
Beetles	
Cleonus piger a weevil	National scarce
Notoxus monocerus a beetle	National scarce
Flies	
Nephtotoma submaculosa a cranefly	National scarce
Butterflies	
Coenonympha pamphilus small heath	UK BAP Priority species
Hipparchia semele grayling	UK BAP Priority species
Lasiommata megera wall	UK BAP Priority species
Moths	
Luperina nickerlii subsp. *gueneei* sandhill rustic	Internationally rare (sub-species endemic to the British Isles); Nationally rare
Sesia benbeciformis luner hornet moth	Nationally rare
Actebia praecox Portland moth	Nationally scarce
Agrostis ripae sand dart	Nationally scarce
Dicallomera fascelina dark tussock	Nationally scarce
Euxoa cursoria coast dart	Nationally scarce
Hydriomena ruberata ruddy highflyer	Nationally scarce
Lithomoia solidaginis golden-rod brindle	Nationally scarce
Lithophane socia pale pinion	Nationally scarce
Mythimna litoralis shore wainscot	Nationally scarce
Sideridis albicolon white colon	Nationally scarce
Xylena exsoleta sword-grass	Nationally scarce; UK BAP Priority species
Amphipoea oculea ear moth	UK BAP Priority species
Amphipyra tragopoginis mouse moth	UK BAP Priority species
Arctia caja garden tiger	UK BAP Priority species
Caradrina morpheus mottled rustic	UK BAP Priority species
Celaena leucostigma crescent	UK BAP Priority species
Chiasmia clathrata latticed heath	UK BAP Priority species
Diarsia rubi small square-spot	UK BAP Priority species
Euxoa nigricans garden dart	UK BAP Priority species
Hepialus humuli ghost moth	UK BAP Priority species
Hydraecia micacea rosy rustic	UK BAP Priority species
Melanchra pisi broom moth	UK BAP Priority species
Mesoligia literosa rosy minor	UK BAP Priority species
Orthosia gracilis powdered quaker	UK BAP Priority species
Scotopteryx chenopodiata shaded broad-bar	UK BAP Priority species
Spilosoma lubricipeda white ermine	UK BAP Priority species
Spilosoma luteum buff ermine	UK BAP Priority species
Tholera cespitis hedge rustic	UK BAP Priority species
Tyria jacobaeae cinnabar	UK BAP Priority species
Xanthorhoe ferrugata dark-barred twin-spot carpet	UK BAP Priority species

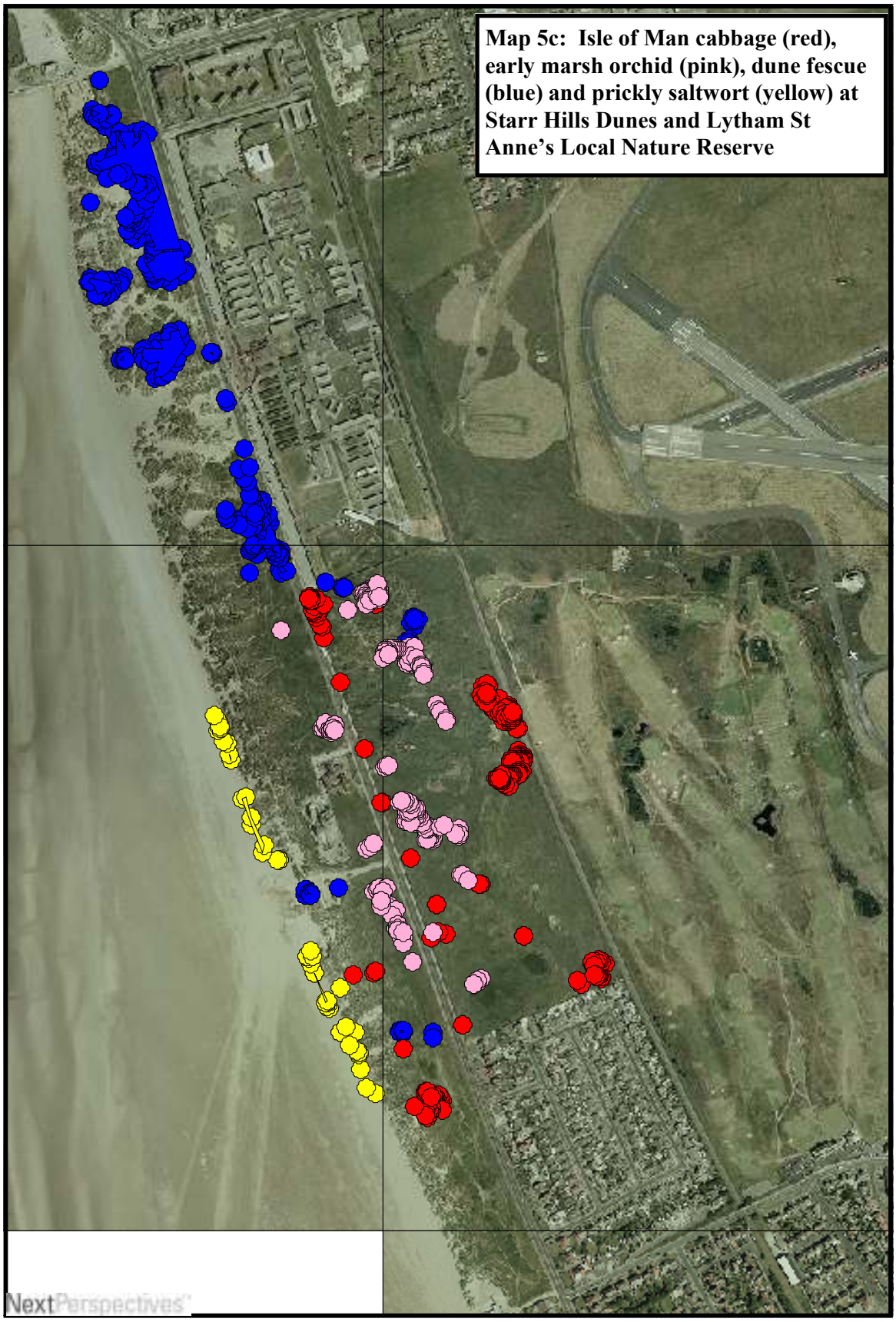
Breeding birds	
Alauda arvensis skylark	Red list species (high conservation concern); UK BAP Priority species
Carduelis cannabina linnet	Red list species (high conservation concern); UK BAP Priority species
Emberiza schoeniclus reed bunting	Red list species (high conservation concern); UK BAP Priority species
Passer domesticus house sparrow	Red list species (high conservation concern); UK BAP Priority species
Sturnus vulgaris starling	Red list species (high conservation concern); UK BAP Priority species
Saxicola torquata stonechat	Amber list species (medium conservation concern)
Reptiles and amphibians	
Zootoca vivipara common lizard	UK BAP Priority species
Bufo bufo common toad	UK BAP Priority species

Map 5: 2008 distribution of nationally notable plants on the Fylde Dunes

Map 5a: Dune helleborine, green-flowered helleborine, Baltic rush hybrid, variegated horsetail, round-leaved wintergreen, flat-sedge, hound's-tongue and hybrid willows at Starr Hills Dunes and Lytham St Anne's Local Nature Reserve




Map 5b: Dune helleborine, green-flowered helleborine, Baltic rush hybrid, variegated horsetail, round-leaved wintergreen, flat-sedge, hound's-tongue and hybrid willows at Fairhaven Dunes
baltic rush hybrid
flat-sedge
round-leaved w intergreen
hound's-tongue
hybrid w illow
dune helleborine
variegated horsetail
seaside centaury
seaside centaury hybrid
green-flow ered helleborine
NextPerspectives


Map 5c: Isle of Man cabbage (red), early marsh orchid (pink), dune fescue (blue) and prickly saltwort (yellow) at Starr Hills Dunes and Lytham St Anne's Local Nature Reserve
NextPerspectives


Map 5d: Isle of Man cabbage (red), early marsh orchid (pink), dune fescue (blue) and prickly saltwort (yellow) at St Anne's Dunes
NextPerspectives


Map 5e: Isle of Man cabbage (red), early marsh orchid (pink), dune fescue (blue) and prickly saltwort (yellow) at Fairhaven Dunes
NextPerspectives

Map 5f: Isle of Man cabbage (red), early marsh orchid (pink), dune fescue (blue) and prickly saltwort (yellow) at Lytham Dunes

3.3 Management Objectives

1. Enhance the nature conservation value of the sand dune and other natural coastal habitats, including the shingle bed and accreting saltmarsh.

2. Increase the area of sand dune and saltmarsh habitats where appropriate, particularly by allowing conditions for natural seaward accretion.

3. Maintain and, where appropriate, enhance sea defences, with natural accretion of sand dune and saltmarsh forming the primary defence and repairs to hard defences only undertaken where current or potential soft defence is not adequate.

4. Promote knowledge, understanding and appreciation of the ecological value of the sand dunes and other natural coastal habitats, and of their key role in coastal flood defence.

5. Enable safe recreational use of the dunes and beach where this does not significantly compromise the nature conservation or flood-defence properties of the dunes and other natural coastal habitats.

4 FACTORS WHICH INFLUENCE OR MAY INFLUENCE THE FEATURES

4.1 Internal Natural Factors

1. Natural succession of fixed dunes to rank vegetation and development of encroaching scrub.
2. Natural accretion of the coastal dune-front between St Anne's Pier and Starr Gate.
3. Natural accretion of saltmarsh at Lytham, Granny's Bay and Fairhaven.
4. Presence of a band of shingle between the dunes and the accreting saltmarsh at Fairhaven.
5. Natural creation of blow-outs.
6. Absence of rabbits on the Local Nature Reserve and apparent low numbers elsewhere.

4.2 Man Induced Factors

1. Erosion of dunes by human activity.
2. Wind-blown sand falling onto the highway and adjacent properties.
3. Removal of sand accumulations from the beach to prevent sand blowing onto the highway.
4. Hard sea defence.
5. Buildings, car parks, storage compounds and other built developments within and adjacent to the dunes.
6. Hard barrier between coastal dunes and inland dunes caused by development of Clifton Drive North and the Promenade.
7. Management of public beach at St Anne's
8. Management of some fixed dune grassland as amenity grassland
9. Spread of non-native scrub and garden plants.
10. Pressure to artificially infill natural blow-holes to kerb anti-social behaviour or because of fears of flood risk.
11. Pressure to control agricultural weeds which are a natural and integral part of the dune vegetation.
12. Impact of dog-walkers and nutrient enrichment caused by dog excrement.
13. Management works to cover saltmarsh with sand due to the perception that saltmarsh is an undesirable habitat causing public beaches to become muddy.
14. The effects of sand winning storage and access.

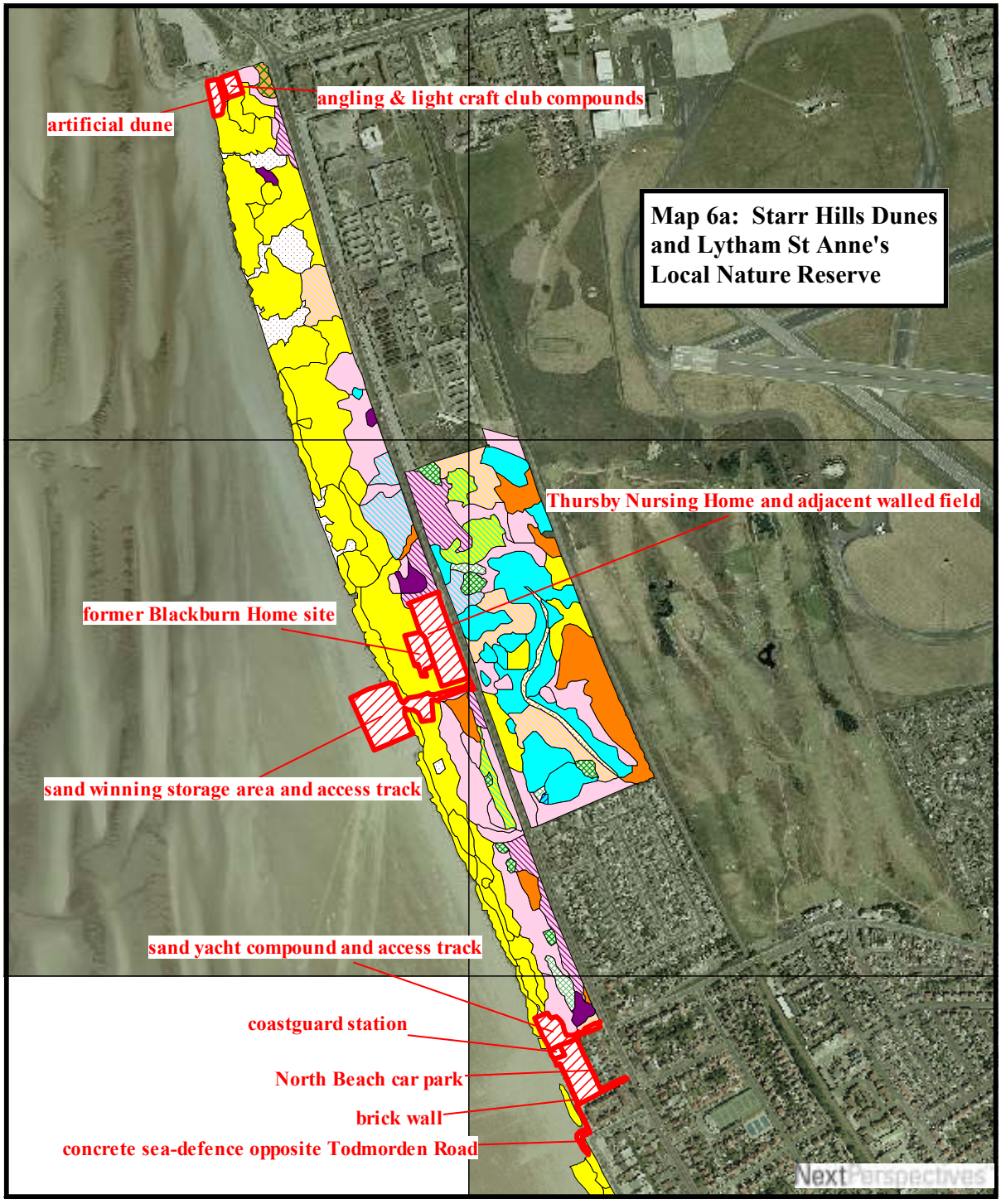
4.3 External Factors

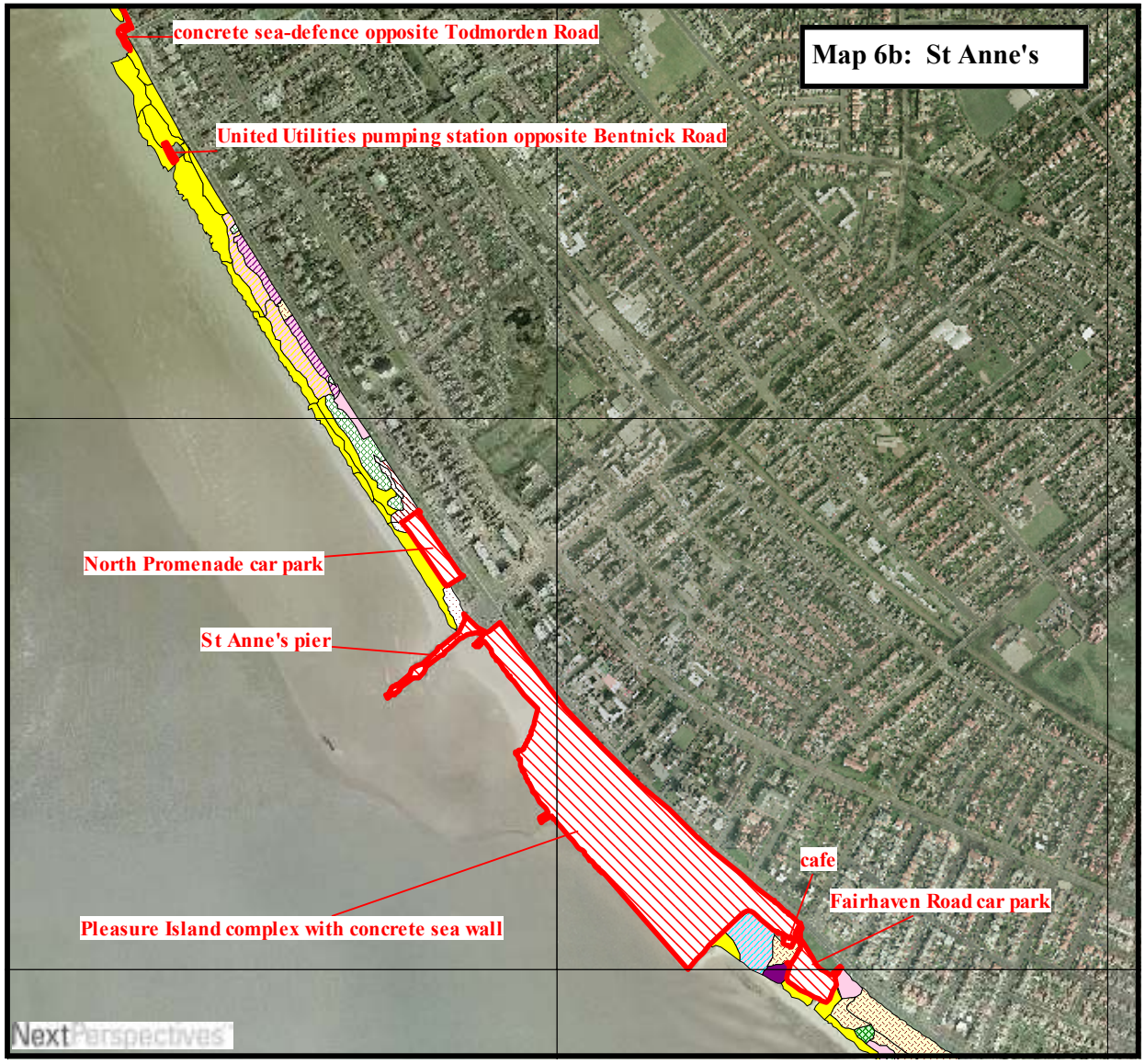
1. Natural dynamics of the coastal system which may vary over time according to natural factors as well as unnatural off-shore or coastline factors, and which need to be worked with rather than against.
2. Predicted climate change and associated rising sea-levels.
3. Atmospheric deposition of nitrogen resulting from extensive global production and use of nitrogen fertilisers and burning of fossil fuel.

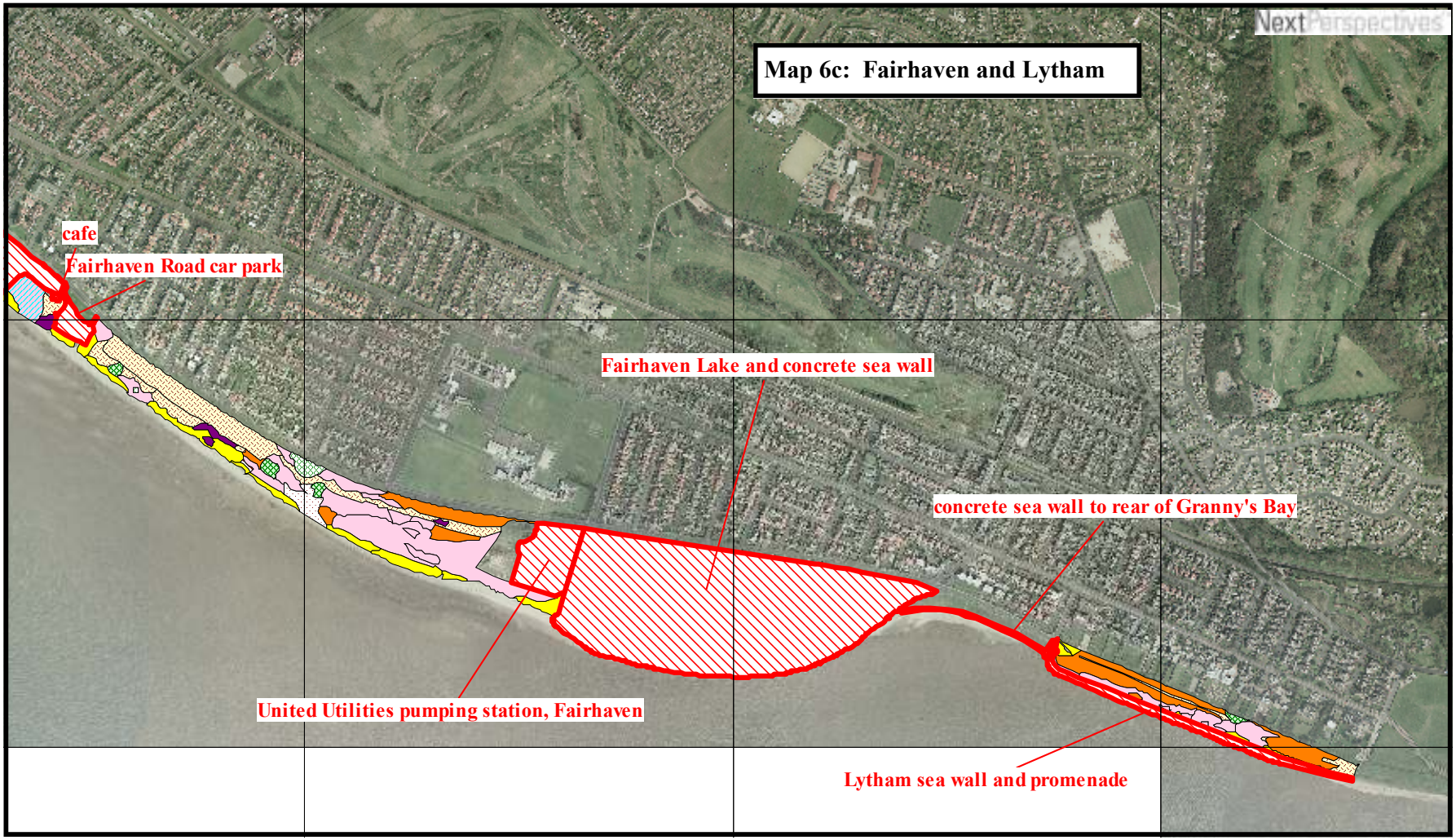
4.4 Management Constraints

1. Under the Wildlife and Countryside Act, 1981, Natural England consent is required to undertake any of the listed *Operations Likely to Damage the Special Interest* within the designated Sites of Special Scientific Interest
2. Restrictions to built development within areas of Lancashire Biological Heritage Site.
3. Constraints to built development imposed by policies within the *Fylde Borough Local Plan* with respect to conservation status of land and natural habitats.
4. Lack of current interpretative material and facilities which would allow easy access for visitors/ school parties.
5. Resources for management and interpretation.
6. Integrity of sea defence structures and the need to allow access for maintenance.
7. Access for maintenance of public utilities
8. Maintenance of public beach and facilities, particularly around St Anne's Pier, and access for sporting and other beach activities.
9. Ownership of the dunes other than by Fylde Borough Council and Blackpool Borough Council.
10. Impact of dune management works upon adjacent landowners.
11. Present system within Fylde Borough Council where different departments are responsible for different aspects of management within the dune system, potentially leading to a lack of communication and failure to act in a strategic manner.
12. Under the Owner's Liability Act, Fylde Borough Council (and other owners) must ensure that every reasonable care is taken to remove any risks to both legitimate visitors and to any trespassers on the site. This includes ensuring that all footpaths, stiles or other constructions are safe, removing any hazardous objects and conducting a safety audit in order to identify any further hazards.
13. Under the Health and Safety at Work Act, 1974, all operations on the site must be undertaken by trained personnel using methods and equipment approved by the Health and Safety Executive. A safety audit is also required.

Map 6: Distribution of man-made features on the Fylde Coast




Map 6b: St Anne's
concrete sea-defence opposite Todmorden Road
United Utilities pumping station opposite Bentnick Road
North Promenade car park
St Anne's pier
Pleasure Island complex with concrete sea wall
cafe
Fairhaven Road car park
NextPerspectives


Map 6c: Fairhaven and Lytham
cafe
Fairhaven Road car park
Fairhaven Lake and concrete sea wall
concrete sea wall to rear of Granny's Bay
United Utilities pumping station, Fairhaven
Lytham sea wall and promenade

Man-made Features along the Fylde Coast

artificial sand dune at Squire's Gate

sports club storage compounds at Squire's Gate

former Blackburn Home site and Thursby Nursing Home

sand-winning access road

erosion of dune toe adjacent to sand-winning storage

sand storage on beach adjacent to Starr Hills Dunes

sand yachting compound, Starr Hills Dunes

Coastguard station

North Beach car park

North Beach car park wall with accumulated sand

brick wall 'sea-defence' between beach and adjacent houses

concrete revetment sea defence (opposite Todmorden Road) in St Anne's Dunes

United Utilities pumping station (opposite Bentnick Road), St Anne's Dunes

Promenade car park, St Anne's

eroded dunes next to St Anne's Pier

St Anne's Pier

St Anne's public beach with sea wall at rear

sea wall around Pleasure Island complex

Fairhaven Road car park

United Utilities pumping station, Fairhaven

Fairhaven Lake from Fairhaven Dunes

sea wall around Fairhaven Lake
(with accreting saltmarsh in foreground)

sea wall at top of Granny's Bay

sea wall beneath Lytham Dunes and promenade

4.5 Impact Assessment

Internal Natural Factors

Natural Succession of Fixed Dunes

In the pioneer, mobile and semi-fixed dunes, natural movement of sand will constantly rejuvenate the vegetation and, unless specific issues arise, these areas generally require no habitat management. However, where the sands are more stable, on the fixed dune grasslands and dune-slacks, there will be a natural succession to a denser, coarser, less herb-rich sward and eventual colonisation and development of scrub. This process is likely to lead to drying of the dune slacks with an associated loss of botanical diversity. To maintain more open, diverse, herb-rich grassland and slacks it is necessary to manage these areas either by controlled grazing or by autumn mowing.

rank grass and creeping willow at Starr Hills

· Hills

Natural Accretion of the Coastal Dune-front

The whole of the Fylde coast currently appears to be in a state of natural accretion, with local accretion of dune vegetation between Squire's Gate and St Anne's Pier and of saltmarsh vegetation at Fairhaven and Lytham where development of such vegetation is not impeded. There is no current evidence of sustained natural erosion on the coast. Blow-outs are a natural and temporary feature of mobile dunes, typically created by movement of sand during storm conditions, while other instances of erosion have resulted from human activity. This situation could change in the future following movement of the coastal channels (either as part of the natural coastal dynamics or resulting from coastal engineering works undertaken elsewhere in the estuary or along the coastline) or through rising sea-levels caused by global climate change.

signs of coastal dune accretion at Starr Hills

Presence of Shingle

A band of shingle presently separates the sand dunes at Fairhaven from the accreting saltmarsh on the beach. It is not clear whether this is a completely natural feature or whether it has resulted from artificial activities, but vegetated shingle is certainly a natural and desirable habitat on British coasts. At Fairhaven, however, the shingle is currently almost devoid of vegetation. This may be partly due to heavy public disturbance along the beach in this area

band of shingle between the dunes and saltmarsh at Fairhaven

but it is believed that this state is principally due to beach-cleaning activities which are removing vegetation in a similar manner to the removal of pioneer sand dune vegetation elsewhere on the coast (see *erosion of dunes by human activity* below). The opportunity exists to allow development of shingle vegetation by excluding vehicle and pedestrian access. Such vegetation would aid the flood-defence properties of the coast and could provide a habitat for notable plant species and also for seed-eating birds over winter.

Natural Creation of Blow-outs

Blow-outs occur within the mobile dunes following storms, where sand is scoured out from a locality and blown elsewhere in the dunes. The resulting hollow of bare sand can appear to be a negative element but in fact is a perfectly natural feature of the sand dune dynamics. In the absence of any further disturbance, blow-outs will gradually re-vegetate and new blow-outs will form elsewhere. The bare sand and early stages of vegetation colonisation are valuable components within the diversity of sand dune system habitats and provide a niche for some notable plant species, including Isle of Man cabbage and dune fescue, as well as being essential for certain specialist invertebrates.

blow-out at Fairhaven

Absence of Rabbits

Rabbits can be very effective grazers of dune grassland and often help to maintain herb-rich grassland by preventing the natural successional processes. Rabbits have been lost from the Local Nature Reserve and appear to occur only in very low numbers elsewhere on the Fylde Coast. Re-colonisation of the Local Nature Reserve may have been inhibited by its separation from the main dune system by the very busy Clifton Drive North. More significantly, however, rabbits are very good at maintaining short-sward grassland but do not favour tall swards. Thus once the grasslands become rank, following loss of the rabbit population, the habitat may no longer be attractive for rabbits to return to. Management of dune grasslands by mowing or controlled grazing should, once more, create favourable conditions for rabbits to assist with future conservation management. Monitoring of rabbit populations may then be necessary as over-grazing by high populations of rabbits can sometimes be damaging due to flower-grazing of notable species.

Man Induced Factors

Erosion of Dunes by Human Activity

There are two forms of erosion occurring on the dunes caused by human activity. Most significant, in terms of its adverse impact, is the erosion along the beach front at the toe of the dunes which is preventing or impeding natural accretion of pioneer and foreshore vegetation. This is caused partly by unrestricted pedestrian activity along the top of the beech and is also affected by vehicular use. Public vehicle use on the beach and dunes is now banned but, while there is occasional illegal vehicle use, there is still fairly frequent traffic of authorised vehicles undertaking maintenance of one form or another along the beach. Most damaging, however, are the mechanical beach-cleaning operations

which not only remove pioneer dune vegetation but also remove the organic detritus on the strandline which attract initial sand deposition and help pioneer vegetation to establish.

Within the established dunes, a little pedestrian disturbance is actually quite beneficial in creating areas of bare sand which can be colonised by specialist plants and invertebrates. However, problems arise where persistent disturbance does not allow vegetation to re-colonise and the areas of bare sand grow increasingly larger. This is particularly an issue in Starr Hills Dunes, opposite Pontins holiday camp, where frequent pedestrian traffic from Pontins and Clifton Drive North to the beach have created huge valleys of bare ground which stretch almost the entire width of the dunes. This is not only bad for wildlife but also compromises the sea-defence properties of the dunes (by allowing water to potentially flood directly along the lines of these valleys) and also exacerbates the problems of sand blowing onto the highway in this area (see below).


heavy erosion caused by frequent pedestrian trampling at Starr Hills

Wind-blown Sand Falling onto the Highway and Adjacent Properties


sand falling onto Clifton Drive North from Starr Hills Dunes

Arguably, wind-blown sand could be considered a natural factor. However, this is only an issue because the features affected (i.e. the roads, houses and other developments) have been built on land which should naturally support sand dune vegetation, while the sand reaches these areas in such quantities because man-induced erosion and fragmentation have resulted in the remnant dunes being too narrow to support a full dune system (from mobile dune to fixed grassland) so that the areas of open beach and mobile sand dune are immediately adjacent to the affected developments. In natural circumstances, wind-blown sand would simply move within the dune system to replenish the dune-building processes. Sand falling onto the highway is considered by the Environment Agency to be contaminated waste and therefore has to be disposed of as such, with associated costs, and cannot be recycled onto the beach. Thus, there is also a loss of sediment from the system which potentially could hinder future dune development.

Removal of Sand Accumulations from the Beach to Prevent Sand Blowing onto the Highway

Accumulations of sand blown in from the beach form adjacent to the brick wall which separates North Beach car park and adjacent sea-front houses from the beach and also by the concrete revetment sea-defence opposite Todmorden Road in the northern part of St Anne's Dunes. Current practice by Fylde Borough Council is to remove this sand regularly using a digger and redistribute it on the lower beach, to prevent over-topping of the wall and sea-defence and the associated problems

of sand falling on the adjacent car park and highway. While this practice alleviates the problem in the short-term it is, however, counter-productive in the long-term and simply serves to sustain the issue. If left alone, build up of sand will eventually stabilise and allow colonisation by dune vegetation, which will eventually protect the car park wall and sea-defence revetment; both limiting the impact of wind-blown sand and improving coastal-defence functions.

Hard Sea-defence

The dunes form the primary sea-defence along most of the coast between Squire's Gate and Lytham, but hard sea-defences have been built at a number of points along the coast; either to reinforce the dunes or to protect artificial developments within the dunes. At the far north of the dunes, a section of frontal dune was reinforced in 1986/87 using 'Tensar' gabion mattresses filled with quarried stone, which is now becoming exposed due to erosion of the overlying sand caused by pedestrian access to the beach. For much of North Beach car park and the adjacent houses, the only protection from the sea is provided by a brick wall. Just down the coast, opposite Todmorden Road, there is an artificial concrete revetment which, it is believed, was intended to prevent recession and stabilise the shoreline with the long-term aim that shoreline levels would improve and the structure would become buried by sand, but this has not occurred to date. Further round the coast, high concrete sea-walls surround the Pleasure Island complex to the south-east of St Anne's Pier and Fairhaven Lake while a low concrete wall has been constructed to the rear of the Granny's Bay saltmarsh. A third high concrete wall, built between 1900 and 1920, lies beneath the Lytham Dunes. Maintenance of these structures will be necessary as required, and vehicular access will occasionally be needed across the dunes or beach to undertake such works. Where appropriate, however, it would be preferable to replace hard sea-defence by accretion of sand dune or saltmarsh, not only to benefit wildlife but also because, in the long-term, this will provide a more efficient and far more cost-effective coastal defence.

Built Developments within the Dunes

There is a long history of man-made developments on the Fylde Dunes which have gradually eroded and fragmented the areas of natural dune vegetation. Most of the inland dune area has been lost to housing, golf courses and transport links which have been constructed over the last 150 years. Apart from the major developments of the Pleasure Island complex and around Fairhaven Lake, the most significant developments affecting the coastal dunes are:- Clifton Drive North, which separates the rich dune habitats of the Local Nature Reserve from the coastal dunes; the storage compounds of the Blackpool Boat Angling Club and the Blackpool Light Craft Club constructed in 1994 at the northern end of Starr Hills; the Blackburn Home site, originally built in 1914 and re-built as a three-storey block of apartments in 2003; the Thursby Nursing Home built in 1904; the Fylde Sand Yachting Club compound (adjacent to the Coastguard Station) which is currently unused following a fatal accident a few years ago; the North Beach car park; the United Utilities pumping station in St Anne's Dunes opposite Bentnick Road; the North Promenade car park near the Pier; the Fairhaven Road car park just to the east of the Pleasure Island complex; and the Fairhaven pumping station immediately to the west of Fairhaven Lake.

As well as causing direct loss of habitat on an immense scale, these various structures fragment the remaining dune area and obstruct movement of sand which restricts the natural development of dune vegetation and compromises the integrity of the dunes as a natural sea-defence. Built structures within and adjacent to the dunes can also significantly impact upon the water table, through drainage or by intercepting precipitation falling on built surfaces, which can lead to loss of existing or potential dune-slack habitat (presently a very scarce resource within the Fylde dune system). For example, loss of dune-slack habitat at Fairhaven (with an associated decline or local loss of several notable plant species) followed the substantial disturbance caused by re-building the Fairhaven pumping station.

Management of Public Beach at St Anne's

The area immediately to the south of St Anne's Pier has been long established as a public beach with development of dune actively discouraged. From an ecological perspective, it would be preferable to allow natural dune formation in this area but this is only a short section of coast, isolated from other dunes by the Pier to the north and the Pleasure Island complex to the south so this is not too critical. Also, the situation is recoverable and will not interfere with potential future flood-defence management unlike the areas of coastal land lost to built development. However, there appears to be a significant issue with sand blowing into St Anne's town centre in this area which will be due mostly to the proximity of this open area of beach to the town. Regular removal of any accumulated sand against the sea wall will reduce the quantity of wind-blown sand but sediment will still blow in from the open beach. Allowing dune development (with associated benefits for wildlife and flood-defence) would provide a buffer between the beach and the town which, in time, would trap most of the wind-blown sand. The public beach would then need to be moved seaward of the dunes, requiring a short walk through the dunes to reach it, though there may be issues to consider with respect to access to and maintenance of the Pier.

Management of Fixed Dune Grassland as Amenity Grassland

amenity grassland developed from dune habitat at Fairhaven

Management of amenity grassland is principally an issue to the rear and, more extensively, to the south-west of Fairhaven Road car park. This grassland lies just behind a narrow ridge of mobile dunes. It has a high cover of perennial ryegrass *Lolium perenne*, which is indicative of past seeding and some form of artificial nutrient enrichment, and is regularly mown to maintain a short-sward for recreation. Given the rarity of dune habitats and the generally widespread availability of short-sward recreational grasslands, it would be desirable to restore this area to a more natural dune grassland.

Spread of Non-native Scrub and Garden Plants

Some scattered scrub on the dunes is beneficial for breeding or resting migrant birds and for invertebrate feeding, perching or shelter. However, certain species can be highly invasive and can easily cover large areas of ground at the expense of species-rich grassland. The most problematic species on the Fylde Coast are sea buckthorn *Hippophae rhamnoides* and white poplar *Populus alba*. White poplar is a non-native introduction to Britain while sea buckthorn is only native on the east coast and

sea buckthorn scrub at Starr Hills

has been introduced elsewhere. Both are able to spread readily in a dune environment. In places scrub cover will need to be trimmed regularly to maintain its existing extent but in other parts of the dunes complete removal would be preferable. In general, the willows, hawthorns and other shrub species just need to be monitored and trimmed back occasionally if deemed necessary. Areas which will require heavy scrub control or removal are the stands of sea buckthorn and white poplar in the southern half of Starr Hills, the large stand of white poplar at the rear of St Anne's Dunes to the north-west of the North Promenade car park, and the stands of sea buckthorn and white poplar in the central area of the Fairhaven Dunes.


white poplar scrub at St Anne's

Another alien species which requires eradication is Japanese knotweed *Fallopia japonica*. This is a persistent and highly invasive weed which has negligible wildlife value. Two stands of Japanese knotweed were found in the Fairhaven Dunes in 2008; one in semi-fixed dunes in the western part of Fairhaven Dunes and one near the roadside in the east, although the latter has actually been identified as an uncommon hybrid of Japanese knotweed with giant knotweed *F. sachalinensis* (= *F.* x *bohemica*) which requires monitoring and probable eradication if found to be spreading. Japanese rose *Rosa rugosa* is also a non-native and invasive shrub which occurs in small patches on the dunes, especially at Fairhaven, and which it would be desirable to remove.

Elsewhere, there are many varieties of garden flowers which can be encountered almost throughout the upper dune areas. Mostly these seem not to be impacting upon the wildlife interest in any significant way and some are useful sources of nectar for a number of invertebrate species. These species may be tolerated, but monitoring will be required to ensure that none become too invasive at the expense of the natural dune vegetation.

Pressure to Artificially Infill Natural Blow-outs

There has been pressure to infill blow-outs because they are sometimes perceived to be a sign of sustained erosion and a risk to the flood-defence properties of the dunes. There are also problems locally with blow-outs being used for camping or barbeques, with associated litter being left behind, and also for various forms of anti-social behaviour, which again have led to calls for infilling of blow-outs. As stated previously, blow-outs are natural features and should not automatically be filled in. Where particular problems exist, most notably where blow-outs are prevented from naturally re-vegetating by persistent man-induced erosion, then blow-outs may require temporary fencing to remove the causes of erosion and planting of marram could be undertaken to stabilise the area. If absolutely necessary, depressions may be filled with sand from the beach or thatched with brush-wood or Christmas trees to trap wind-blown sand and then planted with marram to help bind the sand, but builders rubble, quarried stone or any other artificial substance should not be used.

Pressure to Control Agricultural Weeds

Under the 1959 Weeds Act, there is an obligation upon landowners to control common ragwort *Senecio jacobaea*, broad-leaved dock *Rumex obtusifolius*, curled dock *Rumex crispus*, creeping thistle *Cirsium arvense* and spear thistle *Cirsium vulgare* where there is a risk of these invasive species spreading to agricultural land. Ragwort can be particularly dangerous to livestock because it contains toxins which can have debilitating or fatal consequences if eaten by horses or other grazing animals. Ordinarily, livestock will not eat live plants but are less likely to reject dried ragwort and contamination of forage (hay, haylage and silage) is a particular problem. Guidelines suggest that these species should be controlled within 50 m of agricultural land and monitored for possible spread within 100 m. Defra guidelines for the control of ragwort (Defra 2007) make it clear that the aim of control is not eradication of this species but to control only where there is a risk to agricultural land and livestock.

green-veined white butterfly nectaring on ragwort at Fairhaven

In dune habitats, curled dock is often one of the key components of strandline, pioneer dune and shingle vegetation (where it is usually the sub-species *R. crispus* subsp. *littoreus*, which is not at all invasive), ragwort is a frequent component of semi-fixed and fixed dune grasslands and is also the primary larval foodplant for the resident *UK BAP* Priority species the cinnabar moth *Tyria jacobaeae*, while thistles and ragwort provide excellent sources of nectar for many invertebrate species. There is no agricultural land anywhere near the Fylde Dunes and certainly not within 100 m. Horse-riding is practiced on the beach but there is absolutely no risk of ragwort growing on the beach. Horses should not be present on the dunes because of the excessive disturbance and subsequent erosion of the dunes which this would cause. There is therefore absolutely no reason to control any of these plants where they occur scattered within appropriate zones of the dunes. If these species become locally abundant in any area then this will be because there is a more serious management issue (most likely excessive disturbance and/or nutrient-enrichment) which needs to be addressed and which will not be resolved simply by removal of these plants.

There has been much publicity created and pressure put on councils by horse-owners to control ragwort and there seems to be a perception amongst some people that ragwort must be removed wherever it occurs. Instances have been observed on the dunes where people have taken control of ragwort into their own hands by pulling up the live plants and leaving the dead stems on the ground. This is an extremely misguided action as any passing horse would actually be more likely to eat dry ragwort than live plants. An education programme may be required to highlight the value of ragwort and other 'weeds' on the dunes and explain why their control is not required at this site.

Impact of Dog-walkers

Dog-walking is one of the more common current uses of the dunes. Present level of use causes some erosion, but this appears to be no more significant than the wider public use. It is the frequent human traffic in vulnerable locations that causes problems rather than low levels of public access spread widely over the dunes, and there is no evidence that the presence of dogs causes additional problems. Localised problems are likely to occur where frequent dog fouling leads to nutrient enrichment of the sand, which would lead to a loss of typical dune vegetation in favour of the more commonly occurring coarse and ruderal vegetation. This has been resolved to degree by 2001 legislation making it an offence for dog owners not to remove their dog's faeces from public places, together with Fylde

Borough Council providing dog-waste bins. Disturbance to breeding birds in the dunes or to winter roosting birds on the shoreline could be an issue and this situation needs to be monitored to determine whether sensitive areas need to be protected from disturbance during certain seasons or times of day. Again, there is no evidence at present that dogs are causing significantly more disturbance in this respect than general public use of the dunes and beach.

Management Works to Reduce Area of Saltmarsh

saltmarsh covered by dumped sand at Fairhaven

Works have been carried out by Fylde Borough Council to cover an area of accreting saltmarsh in front of Fairhaven car park with sand. The intension has been to prevent further spread of the saltmarsh towards St Anne's. There seems to be a perception that saltmarsh is an undesirable habitat which will cause the public beaches to become muddy. However, trying to prevent colonisation by saltmarsh is likely to be a losing battle. Where there are large areas of sand which remain exposed during most tides, any forming vegetation will be that of sand dune. If saltmarsh is colonising, the nature of the beach will already be rather muddy due to more frequent tidal inundation. Growth of saltmarsh vegetation is therefore a response to existing silty condition rather than the cause of such. Also, while the saltmarsh may appear unattractively muddy to some during its colonisation phase, if the saltmarsh is left to stabilise then the level of the vegetation may rise, resulting in less frequent inundation of the higher grassland and, in the long-term, a firm and compact coastal grassland could arise, with perhaps more muddy grassland just at the seaward fringes where accretion continues.

Moreover, saltmarsh is an excellent habitat for wildlife and can potential play an important role in the Coast's sea-defence along with the sand dune habitats. The adjacent Ribble Estuary is of international importance for its numbers and diversity of waterfowl. The accreting saltmarsh on the Fylde Coast is not currently included within the SSSI or SPA because it was not present at the time of notification. However, this new area of saltmarsh is, potentially, just as important to the numerous waders and wildfowl as any other areas of saltmarsh in the estuary. While broadening the area of sand dune along the coast to the north of St Anne's Pier would be a feasible and effective way to enhance the flood-defence properties provided by the natural vegetation on this stretch of coast, the nature of the tides and lack of extensive areas of frequently dry sand means that further accretion of the dunes to the south of St Anne's Pier would not be feasible. However conditions clearly are suitable for the development of saltmarsh, which can also provide an extremely efficient component to the coasts sea-defence by absorbing much of the sea's wave action before it reaches the land. Further development of saltmarsh should thus not be discouraged.

The Effects of Sand Winning Storage and Access

Large parts of the Fylde Dunes have been affected by past sand removal for building and industrial purposes. The area of the Local Nature Reserve was subjected to sand extraction in the 1930s and 1940s, with dune vegetation subsequently re-colonising the overburden and scrapes left behind.

The current sand winning operation at Starr Hills is a major issue which is primarily beyond the scope of this management plan. Essentially, this work generates a lot of income for Fylde Borough but is

visibly causing erosion around the toe of the dunes in this area and the broad access track from the road presents a significant flood risk. It also seems rather incongruous to have such heavy machinery operating on a heavily used public beach.

In order to limit further erosion of the dune toe, marker posts have been positioned, behind which sand must not be stored. However, if seaward accretion is encouraged along the length of Starr Hills Dunes, these marker posts will need to be constantly moved forward to keep pace with accretion, otherwise the dunes in this area will always be narrower than elsewhere and more vulnerable to flooding or storm damage.

The issues surrounding sand winning will need to be addressed soon; not least because the adjacent dunes are part of the Site of Scientific Interest (SSSI) and current operations are preventing this site from achieving favourable status. However, this is a major issue in its own right and cannot be fully addressed within the management actions in this document.

External Factors

Natural Dynamics of the Coastal System

Overall the Fylde Coast is currently an accreting system. To the north of St Anne's Pier the wide, sandy beach covered by only the highest tides, enabling long periods of drying in the sunshine, together with the prevailing onshore winds are conducive to formation of coastal dunes. To the south of the pier, and further into the comparative shelter of the Ribble Estuary, the high tides regularly reach the shoreline and the generally wetter and more silty beach provides suitable conditions for the developing saltmarsh. Occasionally there may be some local erosion caused by storm damage, but this it not a sustained process.

Most dune systems in Britain today are retreating due to loss of existing sand and an increase in mean sea-levels around the world. Where dunes are accreting, it is usually because sediment is eroding from another part of the coast. In the case of the Fylde Coast, however, there has been a net accretional trend associated with the Ribble Estuary over the last 150 years. The floor of the south-eastern Irish Sea is veneered with a mantle of largely sandy sediment derived from tidal and current reworking of glacial sediments. Circulation studies in the Irish Sea indicate long-term onshore movement of these sediments. The tendency is favoured by the presence of a large tidal range and a weak ebb tide. The rate has been strongly enhanced by human interference during the last 200 years, which seems to have been triggered by embankment construction and reclamation of land within the Estuary after 1810 which reduced tidal current velocities, leading to deposition. This was followed by the construction of a trained navigation channel between 1847 and 1910 and its subsequent maintenance by dredging which concentrated ebb flow in this over-deepened navigation channel and reduced periodic scour over the sand banks on both sides, and enhanced sedimentation.

Over time, these processes may change according to natural changes in the channel courses within the Ribble Estuary, which may affect the nature and availability of sediment. The combination of wave action and tidal currents could cause redistribution of sediment, perhaps transferring sand from one side of the estuary to the other, or the beaches and dunes outside the estuary could erode and the sand be moved back into the estuary. Unnatural developments (including sand extraction, off-shore constructions, hard sea-defence works and urban and industrial developments elsewhere on the coastline) could also have a significant impact in decreasing sediment supply to the beaches and dunes.

Phases of both coastal retreat and accretion have been reported along the Fylde Coast over the last century. Recent changes in the increase of saltmarsh vegetation around the Ribble Estuary is believed to be due to the cessation of channel dredging following the closure of the Port of Preston in 1980. It is therefore important to take advantage of the accreting system to broaden the area of coastal vegetation so that a more substantial defence exists to counter any possible future changes.

Climate Change

Whether perceived to be caused by man-induced pollution or natural climate cycles, predicted climate change is likely to exacerbate any adverse affects of potential change in coastal dynamics, with expected rises in sea level and an increase in the frequency of storms. Currently an estimated annual rise in sea-level on the Fylde Coast of between 4 and 5 mm is suggested. However, figures published in the *Fylde Borough Strategic Flood Risk Assessment* suggest that an allowance should be made for a sea-level rise of 1000 mm over the next 100 years in order to accommodate likely climate change. This emphasises the need to consider, not just whether the present width of dune is sufficient to restrict flooding in the immediate future but whether sufficient dune remains to cope with long-term flooding risks.

Nitrogen Deposition

Atmospheric nitrogen is created by worldwide production and use of nitrogen fertilisers and burning of fossil fuels, which can be carried 100s of kilometres in the atmosphere before being deposited either in the form of precipitation (rain, snow etc., contributing to 'acid rain') or dry deposition where particles and gasses adhere to the ground, plants and other surfaces. Impacts include contributing to greenhouse gasses in the form of nitrous oxide (with associated implications for climate change), loss of soil nutrients such as calcium and potassium which are essential for long-term soil fertility, acidification of soils, streams and lakes in several regions and increased transport of nitrogen by rivers into estuaries and coastal waters where it is a major pollutant.

Specific impact of nitrogen deposition upon sand dunes was investigated by Jones *et al* (2004) on a series of dune systems throughout Britain, including the Sefton Dunes. This study showed that atmospheric nitrogen deposition was associated with an increase in height and cover of dominant plant species. In the long-term, this increased biomass may accelerate soil development, leading to more rapid stabilisation of the dunes and a reduction in the area of mobile dune. More rapid nitrogen accumulation in the soil may alter the course, or even the endpoint, of the usual dune succession.

The total calculated nitrogen deposition at Sefton was found to be lower than on other measured dunes in England and it seems likely that the Fylde Dunes also may be less affected than many sites due to the relative absence of local heavy industry and because prevailing winds come from Ireland and the Atlantic.

Management Constraints

Sites of Special Scientific Interest

The Local Nature Reserve and the area of Starr Hills immediately opposite is a designated Site of Special Scientific Interest (SSSI) for its biological interest (comprising the Lytham St Anne's Dunes SSSI), while a small area at the rear of the dunes at Fairhaven forms part of the geological Lytham Coastal Charges SSSI. Natural England must be consulted about any proposed changes to management in these areas. This enables Natural England to consider the implications of proposed work upon the notable biological or geological features and provide advice accordingly. Currently the Lytham St Anne's Dunes SSSI is judged to be in unfavourable condition due to uncontrolled vegetation succession and erosion at the dune toe caused by sand winning works.

The Ribble Estuary SSSI boundary mostly follows the high tide line around the Fylde Coast but was drawn about 200 m from the shoreline at St Anne's, Fairhaven and Lytham.

Biological Heritage Site

The majority of the sand dunes and other coastal habitats within Fylde Borough which are not already SSSI are classified as county Biological Heritage Sites. This classification does not affect routine management works but is taken into consideration when any planning proposals are submitted.

Local Plan Policies

Policies are in place within the *Fylde Borough Local Plan* which should protect the natural coastal habitats from inappropriate development. However listed exceptions could be permitted within the terms of the *Plan*, as could redevelopment of existing sites; both of which would subject the already heavily depleted dune resource to further pressure.

Two areas which lie within the general dune area and which have high potential for restoration to dune habitat are currently shown by the *Local Plan* to be included in an area where development could be permitted, as covered by Policy SP1. These are the North Beach car park, next to the Coastguard Station, and the Fairhaven Pumping Station. The North Beach car park is not even marked in the Plan as an *existing car park*, suggesting that it may be considered for some other development within the lifetime of the *Local Plan*.

The car park as it stands has a valuable role to play in promoting tourism and environmental education simply because it is the only place where it is possible to park responsibly in the northern part of the dunes near to the SSSI and Local Nature Reserve where, of course, a large part of the dune's natural history interest lies. The loss of this car park would severely restrict access to these dunes for the general public and deter visits by naturalists for valuable survey and monitoring work. If the car park is not utilised for this purpose then it would be an ideal area to restore to dune, given that the width of dune is no more than a few metres in front of the car park (and in parts non-existent) and because of its vulnerability to flooding. The fenced area of Fairhaven Pumping Station presently includes a large area of dune grassland and development of this site for any other purpose than its existing use would be undesirable. In theory, the dune habitat of Fairhaven Pumping Station should be protected under Policy EP10 of the *Local Plan*, but this requires clarification.

Facilities and Material for Interpretation and Resources for Management and Interpretation
Provision for education and the positive conservation management of the dunes has been seriously neglected over the years. Management of the dunes is desperately required to maintain the nature conservation interest. Public education is necessary to explain both the value of the coastal habitats for wildlife and the importance of these habitats for flood-defence, in order to secure public support for and cooperation with management works. The dunes also provide an outstanding educational resource for use by schools and colleges and hold considerable potential as a tourist feature.

A small visitor centre was built on the Local Nature Reserve. However, the last Reserve warden retired in 2002 and the visitor centre has remained closed since. In the short term, this visitor centre could prove useful for storage of management tools and interpretative materials and could also provide a base for volunteer or contract workers. However, this building is very poorly sited to be a viable visitor centre in the future, having no parking facilities and being detached from the main coastal dunes by an extremely busy road which is often very difficult to cross. It is therefore an unsuitable base for school or college groups arriving by minibus and is unlikely to attract casual visitors.

The employment of a Dune Project Officer is a great advance in promoting management and education. Steps have already been taken towards organising groups of volunteers to carry out small-scale management works, and the Blackpool and Fylde College has offered assistance with interpretation and research projects. However, it is vital that resources are made available to support the work of the Project Officer.

Maintenance of Sea-defence Structures and Public Utilities
Maintenance of key public structures will be necessary as required and vehicular access will occasionally be needed across the dunes or beach to undertake such works. Liaison will be necessary with all legitimate users of the beach to ensure that access routes are determined and works undertaken in the most sympathetic manner possible to preserve the natural coastal habitats. Where appropriate, however, it would be preferable to replace hard sea-defence by accretion of sand dune or saltmarsh and to relocate utilities to alternative sites away from the dunes.

Maintenance of Beach and Facilities
The only maintenance actions required for the beach and facilities which affect the dunes are cleaning of the beach and access to carry out maintenance to the pier. Mechanical cleaning along the dune toe prevents natural dune accretion, and manual litter-picking only should be carried out along the foreshore. Liaison will be required with the pier owners to determine what access is required to the pier and to ensure that works are undertaken in the most sympathetic manner possible to preserve the natural coastal habitats.

For the most part, sporting and recreational activities on the beach do not impinge upon the sand dunes except where clubs have storage compounds in the dunes and where frequent access across the dunes is required. Designated access routes may be necessary in key areas to prevent excessive dune erosion by pedestrians or essential vehicles.

Ownership of the Dunes
The majority of the coastal dunes are owned by Fylde Borough Council and Blackpool Borough Council, and a harmonised approach to management of these dunes should be possible. Apart from the enclosed compounds and built developments, there is a small *circa* 0.5 ha of dune along some 90 m of the sea front in the northern part of the St Anne's Dunes (immediately to the north of the United Utilities pumping station opposite Bentnick Road) which is in private ownership. This land is tied to

the properties of 88 to 96 North Promenade, though it is not partitioned in any way from the surrounding open-access dunes owned by Fylde Borough Council and there is no sign of any claim upon this land being imposed by the owners. Also of significance within the coastal dunes is the walled field at Starr Hills, owned by the adjacent Thursby Nursing Home. This field supports notable plants including variegated horsetail and seaside centaury, yet this is one of the few areas of dune on the Fylde Coast which is neither Site of Special Scientific Interest nor Biological Heritage Site.

Inland, significant areas of the dunes are outside public ownership and owners or occupiers will need to be encouraged to undertake appropriate management works to enhance the quality of their dunes. The most significant landowners in this respect are the St Anne's Old Links Golf Club, the Royal Lytham St Anne's Golf Club, Clifton Hospital and the King Edward & Queen Mary School.

Impact of Dune Management Works upon Adjacent Landowners

For the most part, proposed dune management works should only benefit the neighbouring landowners by enhancing flood defence and reducing quantities of wind-blown sand falling onto properties. However, there may be an issue with the sea-front residents of the houses in Summerfields next to North Beach car park where sand is accumulating against the boundary wall. Allowing stabilisation of the sand and natural development of dune vegetation will be beneficial to these householders in the long-term but potentially there could be problems with leaving sand accumulations in the short-term until the sand settles, including sand over-topping the wall and possibly even damage to the wall. Such problems will need to be addressed with the householders, but the potential restriction to essential flood-defence works caused by private ownership highlights the importance of the Council maintaining control over as much land as possible within the coastal area.

Communication

Under the present system within Fylde Borough Council, different departments are responsible for different aspects of management within the dune system; the Parks Department is responsible for nature conservation, Leisure is responsible for use and enjoyment of the dunes, Street Scene is responsible for cleansing and Technical Services is responsible for sea defence and engineering. Potentially, this can lead to a lack of communication and failure to act in a strategic manner. The recent appointment of a Dune Project Officer should serve to coordinate future works.

5 MANAGEMENT ACTIONS

5.1 Rationale

Quality of Sand Dune, Saltmarsh and Shingle Habitats.
The principal form of habitat management required within the Fylde Dunes is control of the successional processes in the fixed dune grasslands and dune-slacks to maintain a more open, herb-rich sward. Ideally, controlled grazing (preferable by hardy, traditional breeds of sheep, small cattle or ponies) should be employed as this can produce a more diverse, irregular sward which provides a greater diversity of micro-habitats for different plants and invertebrates. In the short to medium term, however, there are likely to be too many practical problems involved to implement grazing. Grazing areas would need to be securely fenced to keep stock off the highways and also from more mobile dunes which are highly vulnerable to erosion caused by stock trampling. There are no current sources of water available for livestock on the dunes so such would need to be provided, and currently the individual areas which require grazing are small and so less likely to be a viable proposition for a commercial grazier.

In the absence of grazing, autumn mowing will both permit the flowering and seeding of desirable herbs and break-down the dominance of rank grasses and creeping willow. Cutting should be carried out by hand using a strimmer or by use of a mower attached to a soft-wheeled tractor to prevent compaction of the ground. All cuttings must be removed from site to prevent nutrient enrichment which would favour more competitive plant species such as coarse grasses, nettles and thistles. Ideally, mowing should be carried out gradually so that small zones are cut progressively over a period of several weeks between late August and early November.

Meadows which are mown in a single cut tend to be poor for invertebrates because of the sudden change in habitat from tall grass to short grass, and numbers are often unable to build up significantly in the intervening year. Staggering the cutting ensures that there are always refuge areas for invertebrates and other animals immediately following cutting and these species are then better able to re-colonise the cut areas as the grass begins to grow again. Also, having some areas which are cut annually and some areas which are cut less frequently on a 3 or 5 year rotation would create a greater diversity of sward conditions which will thus provide habitat for a greater diversity of species. Areas which require cutting include the flatter areas of rear dune grassland at Starr Hills either side of the Thursby Nursing Home, the areas of flat dune grassland and slack in the Local Nature Reserve as well as the areas of coarse grassland at the rear of the Reserve, the dune grassland and coarse grassland areas at the rear of the dunes at Fairhaven and the flatter areas of rear dune grassland at Lytham. Initially, the grasslands identified for mowing could be split into four areas of roughly equal size where one part is mown annually and one of the other parts is mown each year on a three year rotation, so that 50% of the grassland is mown in any given year. The area for annual mowing should generally form the central part of each grassland section, with areas for mowing on rotation surrounding this so as to blend in more gently with the adjoining uncut areas.

The dune grassland management regime should also be extended to the areas of amenity grassland by Fairhaven Road car park, so that this area will be mown no more than once per year with removal of cuttings and no application of fertiliser or other chemical. It may be that the ground has become too compact for dune vegetation to readily colonise following years of frequent mowing and rolling. Some experimental ploughing or removal of surface vegetation could be carried to hasten a more natural dune development.

Cutting and removal of sea buckthorn, white poplar and Japanese rose is required in Starr Hill Dunes

(principally in the southern half, though a small patch of Japanese rose requires control in the north opposite Pontins), at the rear of St Anne's Dunes to the north-west of the North Promenade car park, in the central and eastern parts of the Fairhaven Dunes and in the centre of the Lytham Dunes. Eradication of Japanese knotweed is also required in the western part of Fairhaven Dunes. Where large stands of scrub occur, such as the stand of white poplar at St Anne's, it would be sensible to remove the scrub in blocks gradually over a few years so that the change in habitat is not too sudden and the dune vegetation is allowed to re-colonise more gradually. Until the dune accretes to a more significant width, it may be prudent to retain a strip of poplar at St Anne's at the very rear of the dunes in order to allay any concerns there may be about its removal leading to an increase in quantities of wind-blown sand onto the road.

On the Local Nature Reserve, sea buckthorn should be cut back regularly around the margins of stands to maintain its present extent and similar trimming back of mature white poplar stands at Fairhaven is also required. Elsewhere, the willows, hawthorn and other scrub should be maintained to provide scattered scrub for breeding and migrant birds and for invertebrates, though this situation should be monitored and trimming undertaken if these shrubs are spreading significantly at the expense of dune grassland habitats. The Japanese knotweed hybrid at the eastern end of the Fairhaven Dunes also requires monitoring and trimming back or eradicating as deemed necessary to prevent spread.

Cutting of both grassland and scrub will need to be carried out with care to avoid cutting stands of notable shrub species; most especially the hybrid willows. Precision is critical and at Starr Hills it would be prudent to mark around the hybrid willows immediately prior to mowing to ensure that they are not damaged.

Creation of small scrapes down to the water table to encourage new dune-slack habitat would also be beneficial. The dune slacks on the Fylde Coast are mostly very mature, particularly those within the coastal dunes, so creation of new, young slacks would add to the diversity of habitats. Scrapes should be cut in areas of species-poor vegetation and, where possible, should be created near existing slacks so that both mature and immature slack habitats are present and there is a source of slack species nearby to colonise the new slacks. The likely area for this work will be within the flatter, fixed-dune areas of Fairhaven and Lytham Dunes, and perhaps Starr Hills Dunes and the ranker grassland areas at the rear of the Local Nature Reserve, which have been identified for grassland management. A survey will need to be carried out immediately prior to such work in order to identify suitably species-poor locations and also to identify nearby areas which could appropriately be re-profiled in order to use up the excavated soil.

Where erosion has been heavy in the area of Starr Hill Dunes opposite Pontins, repair of the dunes is required by temporarily fencing off the worst affected areas to prevent further erosion (e.g. using chestnut paling) and possibly employing marram planting or thatching with brush wood or old Christmas trees to hold the sand in order to hasten the stabilisation of these dunes. Appropriately sited boardwalks will help to prevent fresh erosion (see section on *recreation* below). As well as improving the ecological condition of the dunes, this work should, in time, greatly reduce the quantities of wind-blown sand falling onto Clifton Drive North. Re-profiling of the dunes in this area in order to remove the dune hills near to the roadside (as was carried out on both sides of Thursby Nursing Home in the 1970s) is not appropriate. Such work would be extremely damaging to the existing vegetation and wildlife and would also expose and disturb large areas of sand which is likely to make matters even worse in the short term. The vegetation created by re-profiling around Thursby Nursing Home is currently good because the water table was exposed and opportunities for dune-slack vegetation were created. It is hoped that the above described digging of small scrapes will

create similar opportunities but in much more appropriate locations.

The strip of shingle at Fairhaven should also be fenced off using chestnut-paling or posts with strategically placed explanatory notices asking people to avoid walking on the shingle, in order to prevent vehicle access, limit pedestrian access and consequently allow development of shingle vegetation.

Liaison with other dune owners would be beneficial to encourage appropriate management of private dunes. Ideally, the walled field adjacent to Thursby Nursing Home, the perimeter banks of King Edward & Queen Mary school and the grounds of Clifton Hospital should all be managed under a similar grass-cutting regime as that specified for the coastal dune grasslands. The golf courses were not assessed for management requirements during the course of producing this plan, but it would be desirable to provide input into the golf club management plans of both golf courses. Again, ideal management of the golf course is likely to involve annual mowing of dune roughs and, where feasible, seeking to extend the areas of rough where there is potential for dune vegetation development. Discussions should also be held with owners of the private section of dunes at the northern end of St Anne's Dunes in order to explain management works and seek cooperation, although no management works are likely to be required in this area in the near future other than encouraging dune accretion at the seaward edge (see section on *extent of sand dune* below).

It is important to ensure that all works undertaken by Council staff in and around the coastal habitats are coordinated and that all workers are aware of the aims and management regime included within this plan. All work undertaken must be carried out with respect to all legal obligations including health and safety regulations, public liability and notification to Natural England of all management works to be undertaken within the SSSI boundaries.

It is also important to monitor the effects of management in order to ensure that work is having the desired impact and to enable revision, where appropriate, for future management strategies. As a starting point, it would be useful to carry out a base-line habitat survey using the National Vegetation Classification (NVC) during the summer of 2009 immediately prior to most of the management works taking place. Such a survey was undertaken in 2002 (University of Liverpool CRE, 2002) but this does not fully reflect the current state of the dune vegetation, does not include shingle and saltmarsh communities, uses habitat mosaics extensively rather than more detailed community mapping (which is not helpful for management purposes) and uses target notes for areas which do not confer with published communities rather than creating a small number of sensible classifications which would aid management (an attempt has been made to map broad types of non-classified habitat in Map 4 based on these target notes). Using a good aerial photograph and a GPS receiver, it should be possible to produce a detailed map which will help to define management areas. On the Sefton Coast, NVC monitoring is repeated at 15 year intervals to help determine the affects of management upon the types and distribution of vegetation, with additional NVC monitoring undertaken every 5 years in managed areas. This seems a reasonable guide to follow on the Fylde Coast and, with a much smaller area to cover than at Sefton, should not be too costly to implement.

Periodic monitoring of notable indicator species by counts of individuals or distribution mapping would be valuable to ensure that key species are benefiting from management work. In particular it would be useful to identify the locations of all notable hybrid willows to ensure that none are damaged during scrub- or grass-cutting operations. Base-line distribution maps of many of the nationally rare, nationally scarce, Priority BAP and Red Data Book plant species found in 2008 are shown in Map 5 of this document. Additional information is also available for many of the locally uncommon species. It should be stressed, however, that some species populations naturally vary

considerably from year to year and it will therefore be necessary to consider long-term trends rather than necessarily reading too much into the results of two or three successive monitoring years.

Monitoring of non-native plants is also necessary to ensure that such species are not spreading excessively at the expense of native dune vegetation. In the short term, an informal assessment should be all that is required, but more formal local monitoring may be necessary in the future if problems are perceived.

To protect these coastal habitats further, the possibility should be investigated of extending the boundaries of the Lytham St Anne's Dunes and Ribble Estuary Sites of Special Scientific Interest. There is a good case for extending the Lytham St Anne's Dunes SSSI to include all of the coastal dune areas and extending the Ribble Estuary SSSI to include all of the accreting saltmarsh. As can be seen in Map 5, most of the notable dune plant species are confined to the existing Lytham St Anne's Dunes SSSI, though some - in particular Isle of Man Cabbage and dune fescue - are better represented elsewhere on the coast. The accreting saltmarsh at Fairhaven and Lytham has the potential to be as valuable to the bird interest of the Ribble Estuary as much as other areas of saltmarsh already included within the SSSI and therefore there seems no reason to exclude this land.

Production of a management plan for the Local Nature Reserve would be extremely useful in order to consider some of the smaller-scale issues which could not be covered within the broader scope of this report and ensure that this area is managed to the highest possible standard.

Extent of Sand Dune and Saltmarsh Habitats.

To allow seaward advance of the sand dunes, it will be necessary to remove the eroding factors which are currently restricting accretion rates. Conditions for sand dune formation exist throughout the northern part of the Fylde Coast from St Anne's Pier to Squires Gate and along this entire section of dunes either posts or more substantial chestnut-paling fencing should be set up to enclose the area of beach at least 4 m from the toe of the dunes (encompassing any existing accreting vegetation which, in places, is up to 10 m from the main toe of the dune) to prevent all vehicle access and at least most pedestrian access. If posts are used, this will prevent vehicle access, but notices will be required to request that pedestrians stay out of this zone. If fencing is used, this will be more costly to erect and gaps will need to be left at strategic places to allow access from the beach to the rear dunes, but this will be more effective in keeping pedestrians out and is also likely to contribute to the sand-trapping process. Chestnut-paling has been found to be the most appropriate fencing type in such situations because it is both resistant to wave action and also helps to trap sand. It is essential to repair fencing immediately following storms or it is likely to be ripped out completely at the next storm. Ideally the line of posts/fencing should then be moved forward by at least another 4 m each year as the dunes accrete until it is felt that the dune-width has reached its natural limit, but this will need to be reviewed annually according to the observed rate of accretion. In most cases, it will not be possible to re-use posts or fencing as their removal would disturb accumulated sand where these have become buried. Materials used should therefore be as inexpensive as possible and biodegrade within 2 to 3 years.

In key areas, (e.g. the artificial dunes at Squire's Gate, in front of north beach car park and in front of the concrete revetment opposite Todmorden Road), dune accretion is urgently required to combat vulnerable areas and brush wood or old Christmas trees could be used to artificially trap sand, followed by marram planting to bind the sand. Again, it will be essential to ensure that there is no disturbance of the sand in these areas and in particular there should be no removal of accumulated sand. Once vegetation is well established, it should be possible to re-open fenced areas for public use. Discussion will be required with sea-front householders next to North Beach car park in order to explain the long-term benefits of this work. Some careful manual removal of sand may be required along the immediate length of the boundary wall with these properties to prevent over-topping by sand and prevent any risk of damage to the wall, but disturbance of sand should be kept to an absolute minimum and mechanical means of sand removal should not be employed.

Consideration needs to be given to the future of the public beach area at St Anne's, immediately to the south of the Pier, with regard to whether this should be maintained as open beach and accept that there will be continued wind-blown sand falling in the town centre or whether natural development of dune habitat should be allowed and the public beach moved seaward of this. If the site is maintained as public beach then accumulations of sand against the sea wall will need to be cleared regularly and this sand spread over the beach for recirculation into the dune system.

To the south and east of St Anne's Beach, conditions are not suitable for substantial further accretion of dune vegetation, though fencing of the shingle area will allow development of embryo and foredune communities at the dune edge as well as shingle vegetation. Saltmarsh is accreting in seaward parts of this area and this should be encouraged without undue disturbance for both its wildlife and sea-defence properties. In particular, there should be no deliberate dumping of sand on the saltmarsh and vehicle routes required for beach maintenance and routine patrol should be agreed; probably to involve the narrowest possible track at the base of the sea-walls at Pleasure Island, Fairhaven Lake and Lytham Dunes and the strip of compacted sand in-between the shingle and saltmarsh belts at Fairhaven.

To ensure that workers on the ground are fully aware of the coastal management proposals and the reasons for their implementation, a policy for beach cleaning operations should be drawn up to be adhered to by all Council employees.

Existing Fylde Borough policy needs to be supported and upheld vigorously to ensure that no further development will adversely affect the already heavily depleted dunes and other natural coastal habitats. Any proposed development adjacent to the dunes or re-development of existing developed land should be subjected to intense scrutiny to ensure that there would be no adverse impact upon the adjacent dunes. In particular, restriction to movement of sand, the impact on the water-table and the risk of disturbance to dune vegetation during construction works needs to be considered.

With respect to existing man-made developments in the coastal dunes, it would certainly be preferable had permission not be granted for the construction of these structures in the first place but it is clearly now impractical to relocate all of these structures and their occupants. However, should the opportunity arise where a structure is no longer needed or agreement can be reached with the owners or occupiers to relocate to a suitable alternative site, then such opportunities should be taken in future to re-claim these plots and reinstate these areas as part of the dune system. Fylde and Blackpool Borough Councils should be encouraged to take a lead in such action and seek to reinstate appropriate land within their control whenever possible.

Fylde Borough Council should also be encouraged to extend policy to ensure protection from

inappropriate development of the North Beach car park adjacent to the Coastguard Station (either allowing this to become a visitor and education resource, as suggested in the *education and research* section below, or maintained as a site which could potentially by restored to sand dune habitat in the future) and protection of the dune habitat at Fairhaven Pumping Station.

Negotiations must continue to resolve issues surrounding sand winning; in particular addressing erosion of the adjacent dunes, loss of sediment from the system, flood-risks and the affect of wind-blown sand on the highway caused by the access track, and health and safety issues on the beach. The income derived from this operation needs to be balanced against the costs incurred in monitoring and rectifying these matters.

Accretion should be monitored by, at least, annual inspection and by measurements derived from annual aerial photography.

Sea-defences.

Enhancing the Coast's flood-defences will primarily be achieved by expanding the areas of dune and saltmarsh as detailed above. It is essential that every opportunity is taken to increase the area of dune, whether this is by taking advantage of current accretion conditions or by seeking to reinstate coastal dune habitat by removal of man-made structures. If this is not done now, the consequences of likely changes in coastal dynamics and rising sea-levels could mean that very much more drastic action would have to be taken; perhaps in the not too distant future. Such action may involve building expensive hard defences or accepting loss of much larger areas of coastal land.

It is also vital that there should be no further loss of Council control upon land to the seaward side of the coast roads as loss to private developers could severely compromise essential flood defence works which may be required in the future.

Repair of existing hard defences will still be necessary from time to time and it is important to maintain good communication with the engineers responsible for flood-defence and the workers on the ground to ensure that all work is carried out in a manner which is least damaging to the natural coastal habitats.

In the long-term it is intended that the soft, natural defences will have increased to such an extent that at least some of the hard defences will become redundant (e.g. the artificial dunes at Squire's Gate, the concrete revetment in St Anne's Dunes opposite Todmorden Road and the sea-wall below Lytham Dunes) and either will no longer need to be repaired or could be removed completely with natural dune vegetation reinstated in their place.

Education and Research

Providing interpretative material and having someone available to co-ordinate works and discuss public concerns is essential to back up all the proposed management work on the coast in order to ensure public understanding of and compliance with these works. It is therefore vital to ensure that full resources are made available to support the Dune Project Officer.

Provision of interpretative material, such as leaflets, strategically placed notice boards and regular updates on the Council website, together with generation of press releases in conjunction with the Fylde Borough Council Communications Officer, will be required to explain the value of the dunes and the reasons for certain management actions (e.g. exclusion of people from accretion zones at the

dune toe and heavily eroded blow-outs, scrub control, mowing and non-removal of agricultural weeds) and to promote any organised events.

A key target to achieve in the very near future must be to set up a viable visitor/ education centre which would also serve as a focus for volunteer workers on the dunes. The current visitor centre is small and poorly sited for most purposes, so the possibility of establishing a visitor centre at North Beach Car Park, next to the Coastguard Station, needs to be investigated. This is the only obvious location for such a facility. The large car park provides plenty of scope for attracting regular and casual visitors and can easily accommodate minibus loads of school children or college students for guided walks and educational projects. The car park is very close to the SSSI and the Local Nature Reserve and it would be sensible to extend the area of the Local Nature Reserve to include the whole of Starr Hills Dunes. The fact that this car park currently allows free-parking is significant as casual visitors and frequent visitors would not be deterred from calling in to the centre to learn more about the dunes and other coastal habitats or to offer assistance to projects. Over time, such a site would have enormous potential to establish a dedicated education centre with a fully developed schools education programme and a programme of events for local people and visitors to the area, based upon understanding and appreciation of the coastal habitats. Such a centre could greatly enhance the local economy as the dunes increasingly become viewed as a visitor attraction in their own right.

Student research projects which will enhance our understanding of the coastal habitats, and not be damaging to these habitats or their features, should be encouraged whenever opportunities arise. The Blackpool and Fylde College have offered their assistance for research and interpretative projects and good links should be maintained with the college and with other local educational institutions. Continued survey and monitoring by amateur naturalists should also be encouraged and supported as this has generated much of the information presently known about the Fylde Sand Dunes and will undoubtedly make an extremely valuable contribution to future knowledge.

Recreation

Most of the sporting recreational activities which take place on the Fylde beaches are not of direct concern to the dunes and saltmarsh habitats, though frequently used access routes to the beach for sport and other recreational activities are likely to be subjected to a significant degree of erosion. Liaison with organisations who regularly use the beach is required to ensure that activities do not impinge upon the marked accretion zones for both dune and saltmarsh and a limited number of boardwalks should be laid at the most heavily used access points through the dunes to avoid excessive erosion in these parts (including across the heavily eroded dunes opposite Pontins). The boardwalks should be sited so that they reach the beach at an angle to the prevailing wind, to reduce the risks of flooding and erosion, and the end of each boardwalk should be marked on the beach so that they can clearly be seen as the main exit points from the beach. Boardwalks should be provided of a type which can easily be raised, as appropriate, to respond to natural movement of sand, as has successfully been employed on the Sefton Dunes.

Other than the areas marked for seaward accretion and the temporarily fenced areas in Starr Hill Dunes which are allowing heavily eroded areas to recover, there is no need to restrict pedestrian access elsewhere on the dunes. As long as most people use the boardwalks to access the beach, relatively thinly spread pedestrian use over the rest of the dunes should not cause any major erosion issues. Monitoring of this situation will be required, however, and while it would be desirable to minimise the number of boardwalks as much as possible (partly because of the costs involved in laying and maintenance, partly because of the aesthetics in trying to preserve as natural as possible landscape and partly because of a potential direct loss of habitat beneath each boardwalk), it may be

necessary to provide additional boardwalks in the future.

It would be useful to install a pedestrian crossing or footbridge across Clifton Drive North in order to encourage access to the Local Nature Reserve, as this road can be extremely busy and very difficult to cross at times from the only available parking places. Options for this should be investigated.

The existing dog-waste bins need to be maintained and legislation to ensure that dog-walkers remove their dog's excrement should be enforced to prevent local nutrient enrichment of the dunes (with associated changes in the vegetation from stress-tolerant dune plants to more nutrient-demanding ruderal species) as well as to prevent any inherent health risks.

Where large sand hills are building up immediately next to the road and pose a risk to public safety, as sometimes happens along Clifton Drive North and at North Promenade opposite Todmorden Road, some small-scale pushing back of the hills followed by appropriate repair work will be acceptable. In all cases other than extreme emergencies, such sites should be inspected first by the Dune Project Officer or other suitably qualified person to advise on minimising the damage caused to the dune. As the dune repair work in the northern part of Starr Hills and the dune-accretion work along the St Anne's and Starr Hills sea front begin to take effect, such build-up of sand on the roadside should become an increasingly rare event.

Where blow-outs are creating severe social problems, infilling with sand from the beach is permissible, with subsequent marram planting to bind the sand. Thatching with brush wood or Christmas trees to trap sand could also be considered. However, blow-outs should not routinely be in-filled and there should always be thorough justification for carrying out such action. Again, advice should be sought from the Dune Project Officer or other suitably qualified person in each instance.

Liaison will be required with the Pier owners and any other leisure-interest groups to limit the impacts of maintenance activities upon the dunes.

In order to prevent excessive erosion, the ban on unauthorised vehicles on the beach and dunes must be maintained and horse-riding too must continue to be prohibited on the dunes other than along approved access routes to the beach. No evidence of vehicle use on the dunes was observed during survey work in 2008, but this has been an issue in the past and, if necessary, posts could be set along the roadside in accessible areas of dunes to prevent vehicle access.

The Fylde Borough Council Beach Patrol should continue to prevent any prohibited activities.

5.2 Project Register

Operational objective 1: Enhance the nature conservation value of the sand dune and other natural coastal habitats, including the shingle bed and accreting saltmarsh.
1. Undertake autumn mowing in defined areas of fixed dune grassland and dune slack at Starr Hills, the Local Nature Reserve, Fairhaven and Lytham. Cutting should be carried out by hand using a strimmer or by use of a mower attached to a soft-wheeled tractor. All cuttings must be removed from site. Mowing should be carried out gradually so that small zones are cut progressively over a period of several weeks between late August to early November. Initially aim for a 50% cut of identified areas in each year, where 25% is cut annually and a different 25% cut each year on a 3 year rotation.
2. Investigate options for the use of controlled grazing management, instead of mowing, in appropriate areas.
3. Extend the dune grassland mowing regime to the areas of amenity grassland by Fairhaven Road car park, and ensure that this area is mown no more than once per year with removal of cuttings and no application of fertiliser or other chemical.
4. If the ground is too compact in the amenity grasslands for ready colonisation by dune vegetation, undertake removal of surface vegetation or plough experimental plots to allow reversion to dune habitat.
5. Cut and remove sea buckthorn, white poplar and Japanese rose at Starr Hills Dunes and in the central and eastern areas of the Fairhaven Dunes.
6. Cut approximately 80% of the large stand of white poplar at the rear of St Anne's Dunes in blocks gradually over a few years, leaving a narrow band of scrub along the back of the dunes until the width of the dunes has accreted sufficiently to allay concerns that its complete removal may lead to increased wind-blown sand onto the highway.
7. Trim sea buckthorn on the Local Nature Reserve and mature white poplar stands at Fairhaven annually around the margins of each stands to maintain their present extent.
8. Eradicate Japanese knotweed from the western end of Fairhaven Dunes and from anywhere else it might be found in the future.
9. Monitor the stand of Japanese knotweed hybrid at the eastern end of Fairhaven Dunes and control or eradicate as necessary.
10. Monitor scattered scrub elsewhere on the dunes and trim back if found to be spreading significantly at the expense of dune grassland habitats.
11. Determine the location of notable hybrid willows.
12. Immediately prior to any cutting works, mark around notable species (e.g. hybrid willows) to ensure that these are not damaged.
13. In areas of relatively species-poor vegetation within upper dune areas at Lytham, Fairhaven and Starr Hills and in the rank grassland areas at the rear of the Local Nature Reserve, create small scrapes down to the water table to replicate immature slack habitat and use the excavated soil to profile banks in appropriate locations nearby.
14. Where erosion has been heavy in the area of Starr Hill Dunes opposite Pontins, repair the dunes by temporarily fencing off the worst affected areas to prevent further erosion. Possibly employ marram planting or thatching with brush wood or Christmas trees to encourage build-up of sand in order to hasten the stabilisation of these dunes.
15. Fence the strip of shingle at Fairhaven, or mark by posts with strategically placed explanatory notices asking people to avoid disturbing the shingle, to prevent all vehicle access and at least most pedestrian access and allow development of shingle vegetation.

16. Liaise with other dune owners to encourage appropriate management of private dunes (including Thursby Nursing Home, United Utilities, Clifton Hospital, King Edward & Queen Mary School, the golf clubs and the private owners of St Anne's Dunes) and provide support where necessary.
17. Ensure that all works undertaken by Council staff in and around the coastal habitats are coordinated and that all workers are aware of the aims and management regime included within this plan.
18. Undertake a base-line NVC survey of coastal dune, saltmarsh and shingle habitats during the summer of 2009, immediately prior to most of the management works taking place. Repeat at 15 year intervals over the whole site and at 5 year intervals where significant management works are being carried out.
19. Periodically monitor key species by counts of individuals or distribution mapping.
20. Monitor the extent of non-native plants by informal assessment. More formal local monitoring may be necessary in the future if problems are perceived.
21. Investigate the possibilities of extending the Lytham St Anne's Dunes SSSI to include all areas of the Fylde coastal dunes and extending the Ribble Estuary SSSI to include the accreting saltmarsh at Fairhaven and Lytham.
22. Produce a more detailed management plan for the Lytham St Anne's Local Nature Reserve.
Operational objective 2: Increase the area of sand dune and saltmarsh habitats where appropriate, particularly by allowing conditions for natural seaward accretion.
1. Erect chestnut-paling fencing or posts at between 5 and 10 m from the toe of the dunes from St Anne's Pier to Squires Gate (encompassing any existing pioneer vegetation) to prevent all vehicle access and at least most pedestrian access and allow natural dune accretion.
2. If posts are used, notices will be erected to request that pedestrians stay out of this zone. If fencing is used, gaps will need to be left at strategic places to allow access from the beach to the rear dunes.
3. Move the line of posts/fencing forward by another 5 to 10 m each year as the dunes accrete until it is felt that the dune-width has reached its natural limit, but review annually according to the observed rate of accretion. Fencing or posts should not be reused where these are buried by sand, to prevent disturbance to accumulated sand. Inexpensive materials should therefore be used which will biodegrade in 2 - 3 years.
4. In key areas, (e.g. the artificial dunes at Squire's Gate, in front of north beach car park and in front of the concrete revetment opposite Todmorden Road), use brush wood or old Christmas trees to artificially trap sand, followed by marram planting to bind the sand. Ensure that there is no disturbance of the sand in these areas and in particular no removal of accumulated sand.
5. Liaise with sea-front householders in Summerfields next to North Beach car park in order to explain the long-term benefits of dune accretion work.
6. If requested by Summerfields householders, undertake careful manual removal of sand along the immediate length of the boundary wall with these properties to prevent over-topping by sand and prevent any risk of damage to the wall. Ensure that disturbance of sand is kept to an absolute minimum and do not remove sand by mechanical means.
7. Investigate options for the future of the public beach area at St Anne's to determine whether long-term management should be open beach (with associated continued wind-blown sand falling in the town centre but carrying out regular removal of sand accumulations to alleviate this to some degree) or whether natural development of dune habitat should be allowed and the public beach moved seaward of this.

8. Allow accretion of saltmarsh vegetation to the south and east of St Anne's Beach, without undue disturbance.
9. Ensure that there is no deliberate dumping of sand on the saltmarsh.
10. Ensure that vehicle routes required for beach maintenance and routine patrol are agreed; probably to involve the narrowest possible track at the base of the sea-walls at Pleasure Island, Fairhaven Lake and Lytham Dunes and the strip of compacted sand in-between the shingle and saltmarsh belts at Fairhaven.
11. Prepare a policy for beach cleaning operations and ensure that this is adhered to by all relevant Council employees.
12. Apply existing Council policy rigorously to ensure that there will be • no new development within existing areas of sand dune or natural coastal habitat, • no adverse impact to sand dune or natural coastal habitat caused by new development adjacent to the dunes, and • no adverse impact to sand dune or natural coastal habitat caused by re-development of existing structures within or adjacent to the dunes.
13. Whenever opportunities allow, and agreement can be reached with owners and occupiers, remove artificial developments from the coastal dunes and allow re-establishment of the natural dune habitats. Encourage Fylde and Blackpool Councils to take a lead in this respect with land in their control
14. Encourage Fylde Borough Council to extend Policy protection to North Beach car park and Fairhaven Pumping Station in order to clarify that there will be no inappropriate development of these sites.
15. Continue negotiations to resolve issues surrounding sand winning; in particular addressing erosion of the adjacent dunes, loss of sediment from the system, flood-risks and the affect of wind-blown sand on the highway caused by the access track, and health and safety issues on the beach.
16. Monitor dune and saltmarsh accretion by annual inspection and by measurements derived from annual aerial photography.
Operational objective 3: Maintain and, where appropriate, enhance sea defences, with natural accretion of sand dune and saltmarsh forming the primary defence and repairs to hard defences only undertaken where current or potential soft defence is not adequate.
1. Allow repair to existing hard defences as necessary in a manner which is least damaging to the natural coastal habitats.
2. Maintain good communication with the engineers responsible for flood-defence and the workers on the ground to ensure best possible working practices.
3. Promote soft, natural sea-defences as the main form of flood-defence so that, in time, at least some of the hard defences become redundant (e.g. the artificial dunes at Squire's Gate, the concrete revetment in St Anne's Dunes opposite Todmorden Road and the sea-wall below Lytham Dunes) and either will no longer need to be repaired or can be removed completely with natural dune vegetation reinstated in their place.
4. Ensure that there is no further loss of Council control upon land to the seaward side of the coast roads so that any potential future flood defence works are not compromised by concessions to other landowners.

Operational objective 4: Promote knowledge, understanding and appreciation of the ecological value of the sand dunes and other natural coastal habitats, and of their key role in coastal flood defence.
1. Ensure that full resources are made available to support the Dune Project Officer post.
2. Provide interpretative material, such as leaflets, strategically placed notice boards and regular updates on the Council website, to explain the value of the dunes and the reasons for certain management actions.
3. Liaise with the Fylde Borough Council Communications Officer to generate press releases to provide information and promote any organised events.
4. Seek to establish a visitor centre at North Beach Car Park, next to the Coastguard Station.
5. Seek to establish a dedicated education centre at North Beach Car Park, with a fully developed schools education programme and a programme of events for local people and visitors to the area, based upon understanding and appreciation of the coastal habitats.
6. Extend the area of the Local Nature Reserve to include the whole of Starr Hills Dunes.
7. Encourage student research projects which will enhance our understanding of the coastal habitats whenever opportunities arise, providing such work will not be damaging to these habitats or their features.
8. Encourage and support continued survey and monitoring work by amateur naturalists.
9. Maintain good links with the Blackpool and Fylde College and establish links with other local educational institutions.
Operational objective 5: Enable safe recreational use of the dunes and beach where this does not significantly compromise the nature conservation or flood-defence properties of the dunes and other natural coastal habitats.
1. Liaise with organisations who regularly use the beach to ensure that activities do not impinge upon the marked accretion zones for both dune and saltmarsh.
2. Install a limited number of boardwalks at the most heavily used access points through the dunes to avoid excessive erosion in these parts. Boardwalks should be adjustable to accommodate natural sand movement and the beach-ends should be set at an angle to the prevailing winds in order to reduce the risk of flooding or erosion.
3. Mark the ends of these boardwalks so that they can clearly be seen from the beach as the main exit points from the beach.
4. Monitor public use over the rest of dunes and provide additional boardwalks in the future if absolutely necessary to prevent further severe erosion.
5. Investigate options for a pedestrian crossing or footbridge to connect the Local Nature Reserve with the coastal dunes and car park.
6. Maintain dog-waste bins and enforce legislation to ensure that dog-walkers remove all dog excrement.
7. Where essential for safety purposes, large roadside accumulations of sand may be pushed back onto the dune at Clifton Drive North and Promenade North opposite Todmorden Road, but seek the advice of the Dune Project Officer or other qualified person first to minimise damage to the dune ecology.
8. Where severe social problems are occurring in blow-outs, infilling with sand from the beach may be permitted, with subsequent marram planting to bind the sand. Thatching with brush wood or Christmas trees to trap sand could also be considered but builder's rubble, quarried stone or other artificial material should not be used. In each instance, seek the advice of the Dune Project Officer or other qualified person first to minimise damage to the dune ecology.

9. Ensure that the ban on unauthorised vehicles on the beach and dunes is enforced.
10. Ensure that there is no horse-riding across the dunes other than at approved access routes to the beach.
11. If necessary, install posts along the roadside in accessible areas of dunes to prevent vehicle access.
12. Liaise with the pier owners and any other leisure-interest groups to limit impact of maintenance activities upon the dunes.
13. The Fylde Borough Council Beach Patrol should continue to prevent any prohibited activities.
14. Ensure that all work undertaken is carried out with respect to all legal obligations, including health and safety regulations, public liability and notification to Natural England of all management works to be undertaken within the SSSI boundaries.

5.3 Ten-year Work Programme

(1 = high priority, 2 = medium priority, 3 = low priority)

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Habitat management										
H1. Undertake autumn mowing. Initially aim for a 50% cut of identified areas in each year, where 25% is cut annually and a different 25% cut each year on a 3 year rotation.	x	x	x	x	x	x	x	x	x	x
H2. Extend the dune grassland mowing regime to the areas of amenity grassland by Fairhaven Road car park, and ensure that this area is mown no more than once per year with removal of cuttings and no application of fertiliser or other chemical.	x	x	x	x	x	x	x	x	x	x
H3. If the ground is too compact in the amenity grasslands for ready colonisation by dune vegetation, undertake removal of surface vegetation or plough experimental plots to allow reversion to dune habitat.				x	x	x				
H4. Cut and remove sea buckthorn, white poplar and Japanese rose at Starr Hills Dunes and in the central and eastern areas of the Fairhaven Dunes.	x	x	x	x	x		x		x	
H5. Cut approximately 80% of the large stand of white poplar at the rear of St Anne's Dunes in blocks gradually over a few years, leaving a narrow band of scrub along the back of the dunes until the width of the dunes has accreted sufficiently to allay concerns that its complete removal may lead to increased wind-blown sand onto the highway.	x	x	x	x	x		x		x	
H6. Trim sea buckthorn on the Local Nature Reserve and mature white poplar stands at Fairhaven annually around the margins of each stands to maintain their present extent.	x	x	x	x	x	x	x	x	x	x
H7. Eradicate Japanese knotweed from the western end of Fairhaven Dunes and from anywhere else it might be found in the future.	x	x								

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
H8. Control or eradicate the stand of Japanese knotweed hybrid at the eastern end of Fairhaven Dunes as necessary following monitoring.		x	x	x		x		x		x
H9. Trim back other scattered scrub elsewhere on the dunes if found to be spreading significantly at the expense of dune grassland habitats.		x			x			x		
H10. Immediately prior to any cutting works, mark around notable species (e.g. hybrid willows) to ensure that these are not damaged.	x	x	x	x	x	x	x	x	x	x
H11. In areas of relatively species-poor vegetation within upper dune areas at Lytham, Fairhaven and Starr Hills and in the rank grassland areas at the rear of the Local Nature Reserve, create small scrapes down to the water table to replicate immature slack habitat and use the excavated soil to profile banks in appropriate locations nearby.			x	x			x	x		
H12. Where erosion has been heavy in the area of Starr Hill Dunes opposite Pontins, repair the dunes by temporarily fencing off the worst affected areas to prevent further erosion. Possibly employ marram planting or thatching with brush wood or Christmas trees to encourage build-up of sand in order to hasten the stabilisation of these dunes.	x	x	x							
H13. Allow accretion of saltmarsh vegetation to the south and east of St Anne's Beach, without undue disturbance.	x	x	x	x	x	x	x	x	x	x
Estate work										
E1. Fence the strip of shingle at Fairhaven, or mark by posts with strategically placed explanatory notices asking people to avoid walking on the shingle, to prevent all vehicle access and at least most pedestrian access and allow development of shingle vegetation.	x			x			x			x
E2. Erect chestnut-paling fencing or posts at approximately 5 - 10 m from the toe of the dunes from St Anne's Pier to Squires Gate (encompassing any existing pioneer vegetation) to prevent all vehicle access and at least most pedestrian access and allow natural dune accretion.	x									

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
E3. If posts are used, notices will be erected to request that pedestrians stay out of this zone. If fencing is used, gaps will need to be left at strategic places to allow access from the beach to the rear dunes.	x	x	x	x	x	x	x	x	x	x
E4. Move the line of posts/fencing forward by another 5 - 10 m each year as the dunes accrete until it is felt that the dune-width has reached its natural limit, but review annually according to the observed rate of accretion. Fencing or posts should not be reused where these are buried by sand, to prevent disturbance to accumulated sand. Inexpensive materials should therefore be used which will biodegrade in 2 - 3 years.		x	x	x	x	x	x	x	x	x
E5. In key areas, (e.g. the artificial dunes at Squire's Gate, in front of North Beach car park and in front of the concrete revetment opposite Todmorden Road), use brush wood or old Christmas trees to artificially trap sand, followed by marram planting to bind the sand. Ensure that there is no disturbance of the sand in these areas and in particular no removal of accumulated sand.	x	x	x	x	x	x	x	x	x	x
E6. If requested by Summerfields householders, undertake careful manual removal of sand along the immediate length of the boundary wall with these properties to prevent over-topping by sand and prevent any risk of damage to the wall. Ensure that disturbance of sand is kept to an absolute minimum and do not remove sand by mechanical means.										
E7. Allow repair to existing hard defences as necessary in a manner which is least damaging to the natural coastal habitats.	x	x	x	x	x	x	x	x	x	x
E8. Install a limited number of boardwalks at the most heavily used access points through the dunes to avoid excessive erosion in these parts. Boardwalks should be adjustable to accommodate natural sand movement and the beach-ends should be set at an angle to the prevailing winds in order to reduce the risk of flooding or erosion.		x	x							

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
E9. Mark the ends of these boardwalks so that they can clearly be seen from the beach as the main exit points from the beach.		x	x							
E10. Provide additional boardwalks in the future if monitoring suggests that these are absolutely necessary to prevent further severe erosion.										
E11. Maintain dog-waste bins.	x	x	x	x	x	x	x	x	x	x
E12. Where essential for safety purposes, large roadside accumulations of sand may be pushed back onto the dune at Clifton Drive North and Promenade North opposite Todmorden Road, but seek the advice of the Dune Project Officer or other qualified person first to minimise damage to the dune ecology.										
E13. Where severe social problems are occurring in blow-outs, infilling with sand from the beach may be permitted, with subsequent marram planting to bind the sand. Thatching with brush wood or Christmas trees to trap sand could also be considered but artificial material should not be used. In each instance, seek the advice of the Dune Project Officer or other qualified person first to minimise damage to the dune ecology.										
E14. If necessary, install posts along the roadside in accessible areas of dunes to prevent vehicle access.		x	x							
Wardening										
W1. Enforce legislation to ensure that dog-walkers remove all dog excrement.	x	x	x	x	x	x	x	x	x	x
W2. Ensure that the ban on unauthorised vehicles on the beach and dunes is enforced.	x	x	x	x	x	x	x	x	x	x
W3. Ensure that there is no horse-riding across the dunes other than at approved access routes to the beach.	x	x	x	x	x	x	x	x	x	x
W4. Prevent prohibited activities via the Fylde Borough Council Beach Patrol.	x	x	x	x	x	x	x	x	x	x

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Monitoring										
M1. Monitor the stand of Japanese knotweed hybrid at the eastern end of Fairhaven Dunes to determine whether control or eradication should be carried out.	x	x	x							
M2. Monitor scattered scrub to determine whether control is necessary.		x		x		x		x		x
M3. Undertake a base-line NVC survey of coastal dune, saltmarsh and shingle habitats during the summer of 2009, immediately prior to most of the management works taking place.	x									
M4. Repeat NVC monitoring at 15 year intervals over the whole site and at 5 year intervals where significant management works are being carried out.						x				
M5. Periodically monitor key species by counts of individuals or distribution mapping.		x		x		x		x		x
M6. Determine the location of notable hybrid willows.	x	x			x			x		
M7. Monitor the extent of non-native plants by informal assessment. More formal local monitoring may be necessary in the future if problems are perceived.		x			x			x		
M8. Monitor dune and saltmarsh accretion by annual inspection and by measurements derived from annual aerial photography.	x	x	x	x	x	x	x	x	x	x
M9. Monitor public use over the dunes to determine whether additional boardwalks are necessary.		x		x		x		x		x
Administration and planning										
A1. Investigate options for the use of controlled grazing management, instead of mowing, in appropriate areas.		x	x	x	x					

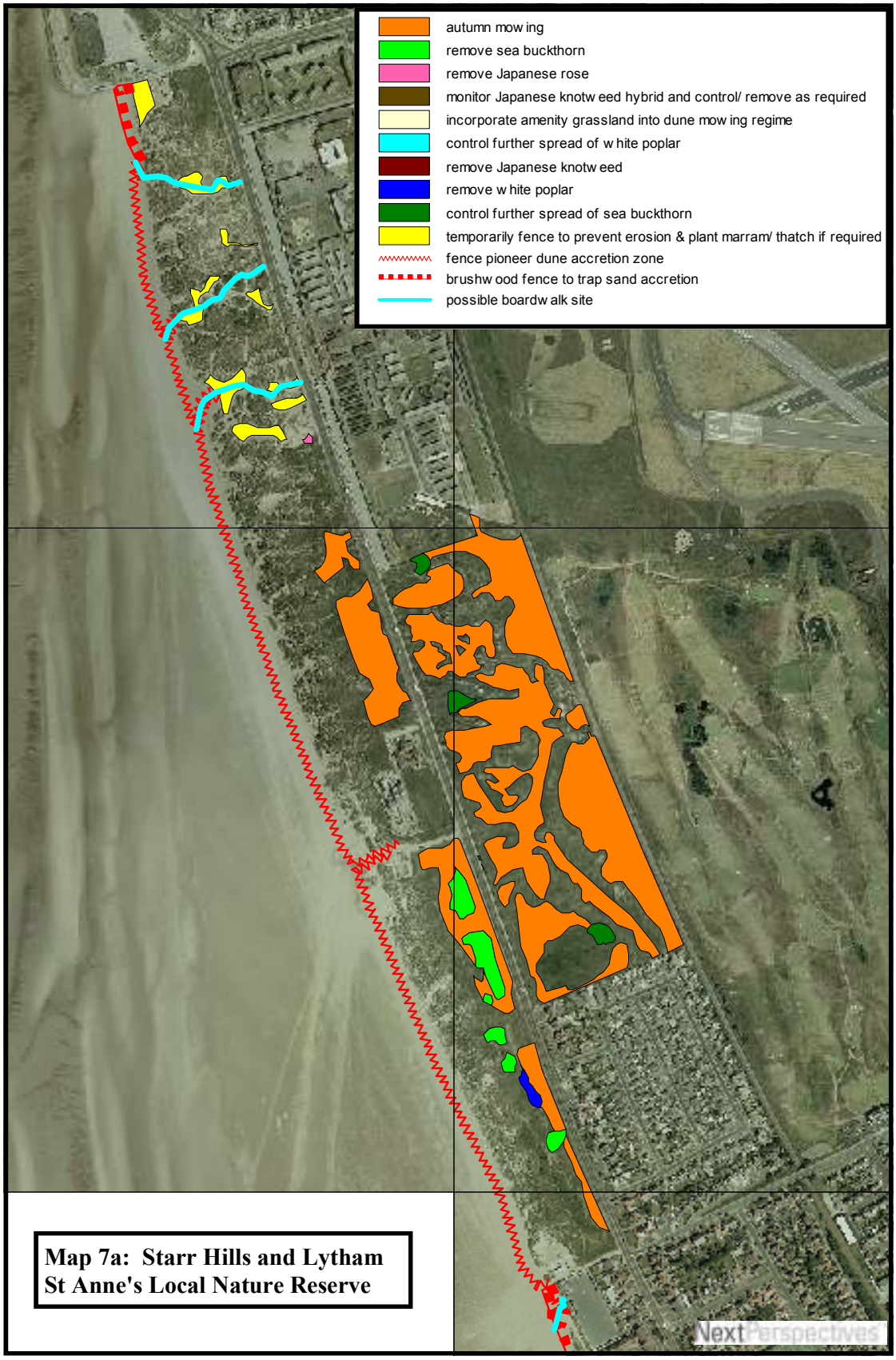
Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
A2. Liaise with other dune owners to encourage appropriate management of private dunes (including Thursby Nursing Home, United Utilities, Clifton Hospital, King Edward & Queen Mary School, the golf clubs and the private owners of St Anne's Dunes) and provide support where necessary.	x	x	x	x	x	x	x	x	x	x
A3. Ensure that all works undertaken by Council staff in and around the coastal habitats are coordinated and that all workers are aware of the aims and management regime included within this plan.	x	x	x	x	x	x	x	x	x	x
A4. Produce a more detailed management plan for the Lytham St Anne's Local Nature Reserve.	x	x								
A5. Investigate the possibilities of extending the Lytham St Anne's Dunes SSSI to include all areas of the Fylde coastal dunes and extending the Ribble Estuary SSSI to include the accreting saltmarsh at Fairhaven and Lytham.	x	x	x							
A6. Liaise with sea-front householders in Summerfields next to North Beach car park in order to explain the long-term benefits of dune accretion work.	x									
A7. Investigate options for the future of the public beach area at St Anne's to determine whether long-term management should be open beach (with associated continued wind-blown sand falling in the town centre but carrying out regular removal of sand accumulations to alleviate this to some degree) or whether natural development of dune habitat should be allowed and the public beach moved seaward of this.	x	x	x							
A8. Ensure that there is no deliberate dumping of sand on the saltmarsh.	x	x	x	x	x	x	x	x	x	x

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
A9. Ensure that vehicle routes required for beach maintenance and routine patrol are agreed; probably to involve the narrowest possible track at the base of the sea-walls at Pleasure Island, Fairhaven Lake and Lytham Dunes and the strip of compacted sand in-between the shingle and saltmarsh belts at Fairhaven.	x	x	x	x	x	x	x	x	x	x
A10. Prepare a policy for beach cleaning operations and ensure that this is adhered to by all relevant Council employees.	x									
A11. Apply existing Council policy rigorously to ensure that there will be • no new development within existing areas of sand dune or natural coastal habitat, • no adverse impact to sand dune or natural coastal habitat caused by new development adjacent to the dunes, and • no adverse impact to sand dune or natural coastal habitat caused by re-development of existing structures within or adjacent to the dunes.	x	x	x	x	x	x	x	x	x	x
A12. Whenever opportunities allow, and agreement can be reached with owners and occupiers, remove artificial developments from the coastal dunes and allow re-establishment of the natural dune habitats. Encourage Fylde and Blackpool Councils to take a lead in this respect with land in their control	x	x	x	x	x	x	x	x	x	x
A13. Encourage Fylde Borough Council to extend Policy protection to North Beach car park and Fairhaven Pumping Station in order to clarify that there will be no inappropriate development of these sites.	x	x								
A14. Continue negotiations to resolve issues surrounding sand winning; in particular addressing erosion of the adjacent dunes, loss of sediment from the system, flood-risks and the affect of wind-blown sand on the highway caused by the access track, and health and safety issues on the beach.	x	x	x							

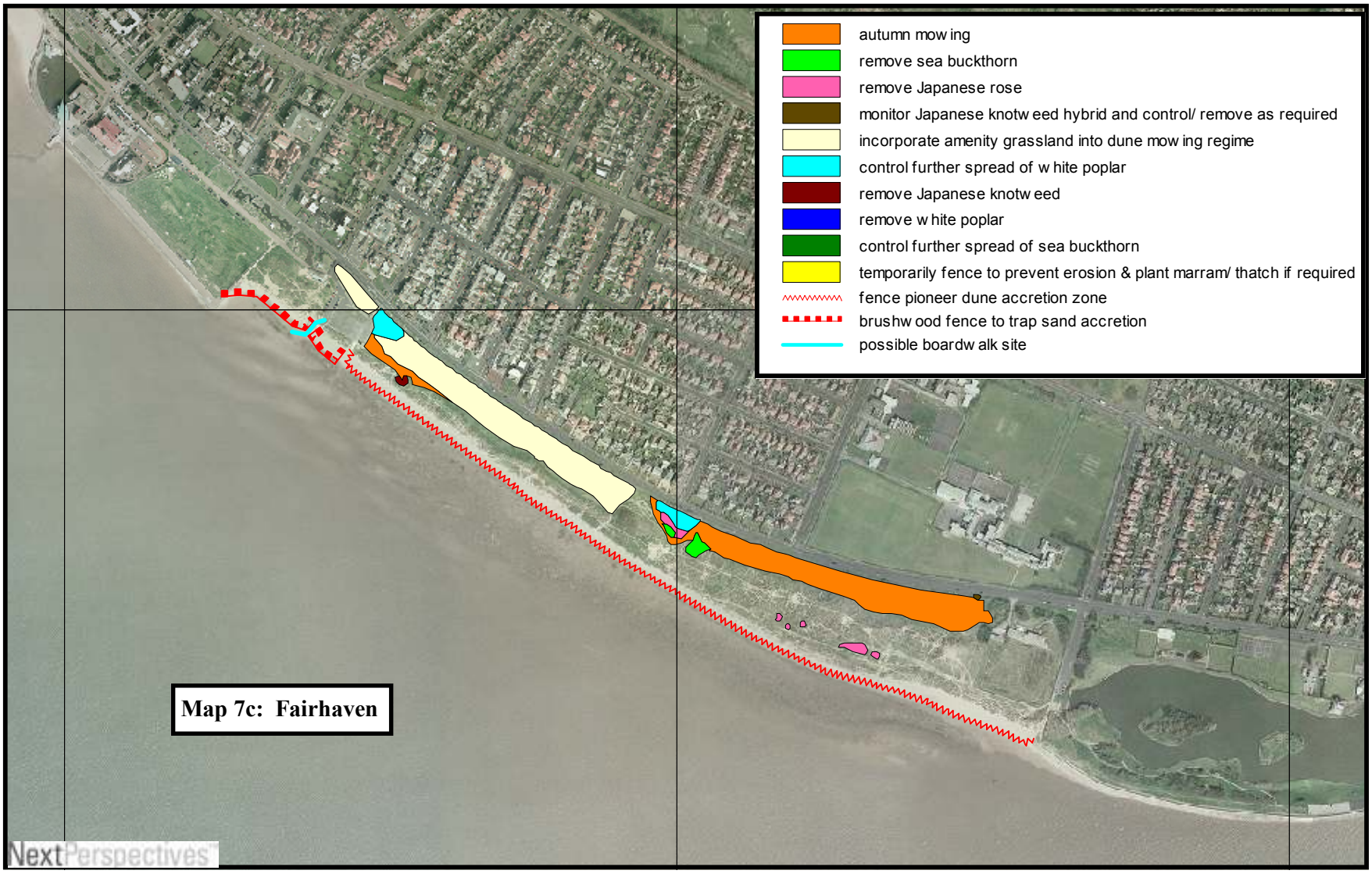
Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
A15. Maintain good communication with the engineers responsible for flood-defence and the workers on the ground to ensure best possible working practices.	x	x	x	x	x	x	x	x	x	x
A16. Promote soft, natural sea-defences as the main form of flood-defence so that, in time, at least some of the hard defences become redundant (e.g. the artificial dunes at Squire's Gate, the concrete revetment in St Anne's Dunes opposite Todmorden Road and the sea-wall below Lytham Dunes) and either will no longer need to be repaired or can be removed completely with natural dune vegetation reinstated in their place.	x	x	x	x	x	x	x	x	x	x
A17. Ensure that there is no further loss of Council control upon land to the seaward side of the coast roads so that any potential future flood defence works are not compromised by concessions to other landowners.	x	x	x	x	x	x	x	x	x	x
A18. Ensure that full resources are made available to support the Dune Project Officer post.	x	x	x	x	x	x	x	x	x	x
A19. Provide interpretative material, such as leaflets, strategically placed notice boards and regular updates on the Council website, to explain the value of the dunes and the reasons for certain management actions.	x	x	x	x	x	x	x	x	x	x
A20. Liaise with the Fylde Borough Council Communications Officer to generate press releases to provide information and promote any organised events.	x	x	x	x	x	x	x	x	x	x
A21. Seek to establish a visitor centre at North Beach Car Park, next to the Coastguard Station.	x	x	x							
A22. Seek to establish a dedicated education centre at North Beach Car Park, with a fully developed schools education programme and a programme of events for local people and visitors to the area, based upon understanding and appreciation of the coastal habitats.		x	x	x	x					

Project	year in which work to be done and estimated cost									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
A23. Extend the area of the Local Nature Reserve to include the whole of Starr Hills Dunes.	x	x	x							
A24. Encourage student research projects which will enhance our understanding of the coastal habitats whenever opportunities arise, providing such work will not be damaging to these habitats or their features.	x	x	x	x	x	x	x	x	x	x
A25. Encourage and support continued survey and monitoring work by amateur naturalists.	x	x	x	x	x	x	x	x	x	x
A26. Maintain good links with the Blackpool and Fylde College and establish links with other local educational institutions.	x	x	x	x	x	x	x	x	x	x
A27. Liaise with organisations that regularly use the beach to ensure that activities do not impinge upon the marked accretion zones for both dune and saltmarsh.	x	x	x	x	x	x	x	x	x	x
A28. Investigate options for a pedestrian crossing or footbridge to connect the Local Nature Reserve with the coastal dunes and car park.	x	x	x							
A29. Liaise with the pier owners and any other leisure-interest groups to limit impact of maintenance activities upon the dunes.	x	x	x	x	x	x	x	x	x	x
A30. Ensure that all work undertaken is carried out with respect to all legal obligations, including health and safety regulations, public liability and notification to Natural England of all management works to be undertaken within the SSSI boundaries.	x	x	x	x	x	x	x	x	x	x

Map 7: Location of required management works




autumn mowing
remove sea buckthorn
remove Japanese rose
monitor Japanese knotweed hybrid and control/ remove as required
incorporate amenity grassland into dune mowing regime
control further spread of white poplar
remove Japanese knotweed
remove white poplar
control further spread of sea buckthorn
temporarily fence to prevent erosion & plant marram/ thatch if required
fence pioneer dune accretion zone
brushwood fence to trap sand accretion
possible boardwalk site
Map 7b: St Anne's
NextPerspectives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control further spread of sea buckthorn
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fence pioneer dune accretion zone
brushwood fence to trap sand accretion
possible boardwalk site
Map 7c: Fairhaven
NextPerspectives


autumn mow ing
remove sea buckthorn
remove Japanese rose
monitor Japanese knotw eed hybrid and control/ remove as required
incorporate amenity grassland into dune mow ing regime
control further spread of w hite poplar
remove Japanese knotw eed
remove w hite poplar
control further spread of sea buckthorn
temporarily fence to prevent erosion & plant marram/ thatch if required
fence pioneer dune accretion zone
brushw ood fence to trap sand accretion
possible boardw alk site
Map 7d: Lytham
NextPerspectives