



Pembrokeshire Green

Infrastructure Assessment

Overview of Settlement Management Plans

Pembrokeshire County Council

[Status]

Prepared by LUC

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Pembrokeshire Green Infrastructure Assessment

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Chapter 1

Introduction

1.1 The Green Infrastructure (GI) Settlement Management Plans integrate and update current thinking and initiatives presented within the Pembrokeshire GI Action Plan (now superseded).

1.2 Each of the 11 Settlement Management Plans provide a streamlined approach to the identification and delivery of GI interventions. Their aim is to help policymakers, developers, community groups and residents to deliver appropriate, multifunctional and resilient GI across 11 settlements in Pembrokeshire.

1.3 Within each Settlement Management Plan, a long list of projects has been identified through public consultation, stakeholder consultation, site visits and professional judgement. The long list provides a variety of project types, scales and costs, and is intended to be taken forward by various partners as and when funding becomes available. By delivering a diversity of projects, the variety of benefits and ecosystem services experienced across each settlement will grow.

1.4 Three 'kickstarter' projects have been selected from this long list for each settlement. These three projects are intended as GI exemplars and should be put forward first for delivery. It is hoped that the delivery of these kickstarter projects should get the ball rolling for GI within each settlement, and also help to build public and stakeholder appetite for future projects. For each settlement, one of the three kickstarter projects relates to the water environment, highlighting the need for natural flood management and nature-based solutions to water quality across Pembrokeshire.

1.5 The rationale for identifying the kickstarter projects included:

- Popularity with the public

- The public were asked to rate their favourite projects through an online survey. The more popular projects for each settlement were reviewed and given priority.
- Multifunctionality and range of benefits
 - Projects that provide multiple benefits and align with a number of the GI principles (see below) were put forward.
- Timescales
 - A range of timescales, including quick win, medium-term and long-term projects, were put forward to allow for a variety of scales, delivery mechanisms and aspirations to be met.
- Deliverability
 - Projects that were deemed to be 'more deliverable' were put forward, for example, being located on Council-owned land, relating to a clear funding stream, or aligning with existing community group aspirations.
- Professional judgement
 - The finalised list of 'kickstarter' projects was compiled using professional judgement to ensure the above criteria provided a multifunctional and representative list of projects to be taken forward first.

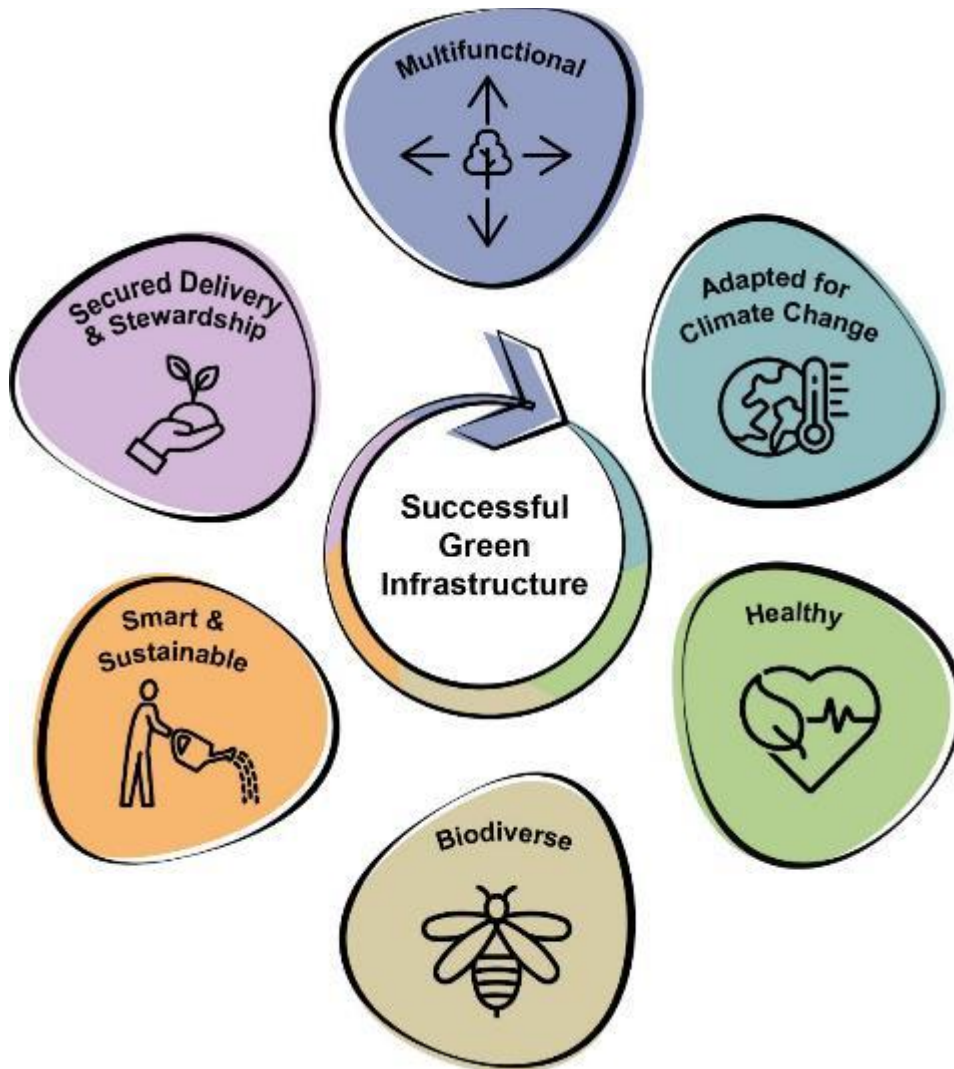
1.6 The Urban Tree Planting and Pollinator Strategies are supplementary to the Settlement Management Plans and should be read in conjunction with the Plans. Their role is intended to provide additional guidance when delivering urban tree planting or pollinator-related projects.

1.7 All GI projects should be developed to ensure consistency with active travel proposals included on the Integrated Network Maps (INMs) [\[See reference 1\]](#) for Pembrokeshire.

Green Infrastructure Principles

1.8 A series of GI Principles have been developed which apply to all GI across Pembrokeshire, therefore spanning all 11 Settlement Management Plans. The principles are based on Natural Resources Wales' '5 Principles of GI', which have been created to ensure well-designed GI provides a range of benefits for both people and wildlife alike. An additional principle 'Successful delivery' has been included to ensure that good quality ideas and designs are taken forward and their longevity secured through well-planned stewardship arrangements. These six overarching principles have been broken down into sub-principles to provide more guidance on the specific design and delivery of good quality and successful GI across Pembrokeshire.

Figure 1.1: Six overarching principles for successful Green Infrastructure



1. Multifunctional

1.9 Ensure all GI across Pembrokeshire is delivering as many benefits as possible.

- 1a - Multifunctional
 - At the heart of all good GI is multifunctionality. All GI should be multifunctional and deliver a range of ecosystem services to support

biodiversity, climate targets, health and wellbeing and economic prosperity.

■ 1b - Varied

- GI should be varied and deliver a mixture of asset types, including both habitats and recreation. This should also be coupled with its delivery at a variety of scales.

■ 1c - Respond to local character

- GI should respond to its local context and contribute towards a distinct sense of place, particularly when located within the Pembrokeshire Coast National Park. It should take account of landscape character, key views, native species, habitats and current land use.

2. Adapted for climate change

1.10 Ensure all GI is delivering both climate change mitigation and adaptation.

■ 2a - Carbon sequestration

- All GI should contribute towards the removal and long-term storage of carbon from the atmosphere, to some extent.

■ 2b - Encourage active lives

- GI should help contribute towards reducing the reliance on personal vehicles and instead encourage active lifestyles.

■ 2c - Natural flood management

- All GI should provide some opportunities for natural flood management, including from fluvial, marine, groundwater and surface water sources.

■ 2d - Adaptable and resilient

- GI proposals should be adaptable and resilient to move with the changing pressures of climate change. GI should be designed with future climate change projections in mind

3. Healthy

1.11 Ensure all GI is contributing towards the creation of physically and mentally healthier communities.

- 3a - Accessible to all
 - GI should be designed inclusively for all demographics, regardless of age, gender, maternity, ethnicity and physical or mental ability. All green spaces should respond to the needs of less mobile users and forgotten demographics, such as teenage girls or those with dementia. Green spaces should feel safe for all and connect different communities.
- 3b - Supports prosperous communities
 - GI should be used as a tool for investment and therefore be included as a key part of any regeneration plans.
- 3c - Connects people to nature
 - Green space and GI should always be designed to allow for some interactions with nature, no matter how small, as well as filling gaps of green space deficiency.
- 3d - Promote community and local food growth
 - Community gardens, edible corridors and sustainable local food growth should be promoted for its mental and physical health benefits, as well as the positive impacts it can have on wildlife and community cohesion.
- 3e - Address poor air quality
 - Where poor air quality is identified, GI should be utilised as a nature-based solution to the removal of particulates alongside reducing reliance on polluting modes of transport.

4. Biodiverse

1.12 Ensure all GI is supporting a variety of native species in providing opportunities for food, shelter and movement.

- 4a - Protect
 - GI projects should, first and foremost, work to protect and enhance existing important biodiversity assets, including designated habitats and notable species. Helping struggling wildlife communities and habitats in poor condition to recover should be a priority.
- 4b - Connected
 - GI of all scales should be used to help connect habitats and reduce fragmentation. This should include restoring and re-connecting linear habitat features, including road verges, riparian corridors and hedgerows. Work with local landowners and farmers to promote this, alongside emerging agri-environment schemes.
- 4c - Contribute towards Section 6 duty requirements
 - Section 6 of the Environment (Wales) Act 2016 places a general duty on public authorities to, “seek to maintain and enhance biodiversity in the exercise of functions... and in so doing promote the resilience of ecosystems”. The Nature Recovery Action Plan for Pembrokeshire sets the strategic context for actions to protect and enhance biodiversity and ecosystems in the county.
- 4d - Water quality
 - GI’s ability to deliver nature-based solutions to water quality should always be explored, for example through wetlands adjacent to combined sewer overflow, SuDS and riparian buffers. However, controlling water quality at the source of the problem should always be the priority.
- 4e - Prioritise native species

- GI design should utilise native species, particularly those of local provenance. It should always align with local habitat and species needs, as well as always exploring options for pollinators.

5. Smart and sustainable

Ensure all GI is as low maintenance as possible, whilst reducing pollution and maximising sustainably sourced materials.

- 5a - Design for low maintenance
 - GI should be designed to ensure it is low maintenance and that these straightforward management solutions will continue to deliver the GI asset's intended benefits. Management needs to be long-term and secured from the outset of a project, for example through engaging with communities.
- 5b - Utilise natural and sustainable materials
 - Materials and street furniture used within GI design, for example, benches and signage, must use sustainably sourced and naturalistic, yet robust.

6. Secured delivery and stewardship

1.13 Ensure all GI projects have their successful delivery and long-term stewardship secured from the outset.

- 6a - Involve the community from the outset
 - Include all demographics of the local community within the co-design and co-planning of a GI project, ensuring areas of the greatest need are prioritised first. Where possible, community ownership should be explored.
- 6b - Involve a diversity of stakeholders and delivery partners

- Alongside citizens, include all appropriate landowners, businesses, developers, environmental groups, local authorities, council members and officers, statutory and non-statutory consultees, utility companies, and those responsible for the management of GI assets, within the planning, designing, delivery and ongoing stewardship of GI. Ensure all parties are aligned with the shared vision and kept up to date with progress.
- Due to the historic fabric of the settlements, it is recommended that early consultation with Cadw, Dyfed Archaeological Trust (DAT), landowners and occupiers is undertaken to understand the key historic environment considerations of individual sites. GI Projects should ensure that proposals do not result in detrimental impacts on heritage assets, including adverse changes to the settings of scheduled monuments or conservation areas.
- Due to a number of the settlements being located within or adjacent to the Pembrokeshire Coast National Park, it is recommended that early consultation with Pembrokeshire Coast National Park Authority is undertaken. This also applies to Natural Resources Wales due to the significant number of national and international ecological designations both within and adjoining all settlements.
- 6c - Understand the benefits
 - Ensure all parties involved, including stakeholders and the community, understand the benefits of the project, both qualitative and quantitative. This could also form the baseline for ongoing monitoring and measuring whether projects are as successful as first thought.
- 6d - Diversify delivery mechanisms and broaden inclusion in policy
 - Ensure GI is integrated across a diversity of planning hooks, including in the Local Development Plan, subsequent Supplementary Planning Guidance, health strategies, climate change strategies, and economic or regeneration plans.
- 6e - Plan for ongoing monitoring

- When planning GI interventions, consider how ongoing monitoring of the asset will be undertaken and how this data will be used to recognise successes or shortfalls.

Chapter 2

Fishguard and Goodwick

Figure 2.1: Fishguard and Goodwick



A Portrait of Fishguard and Goodwick's Green Infrastructure

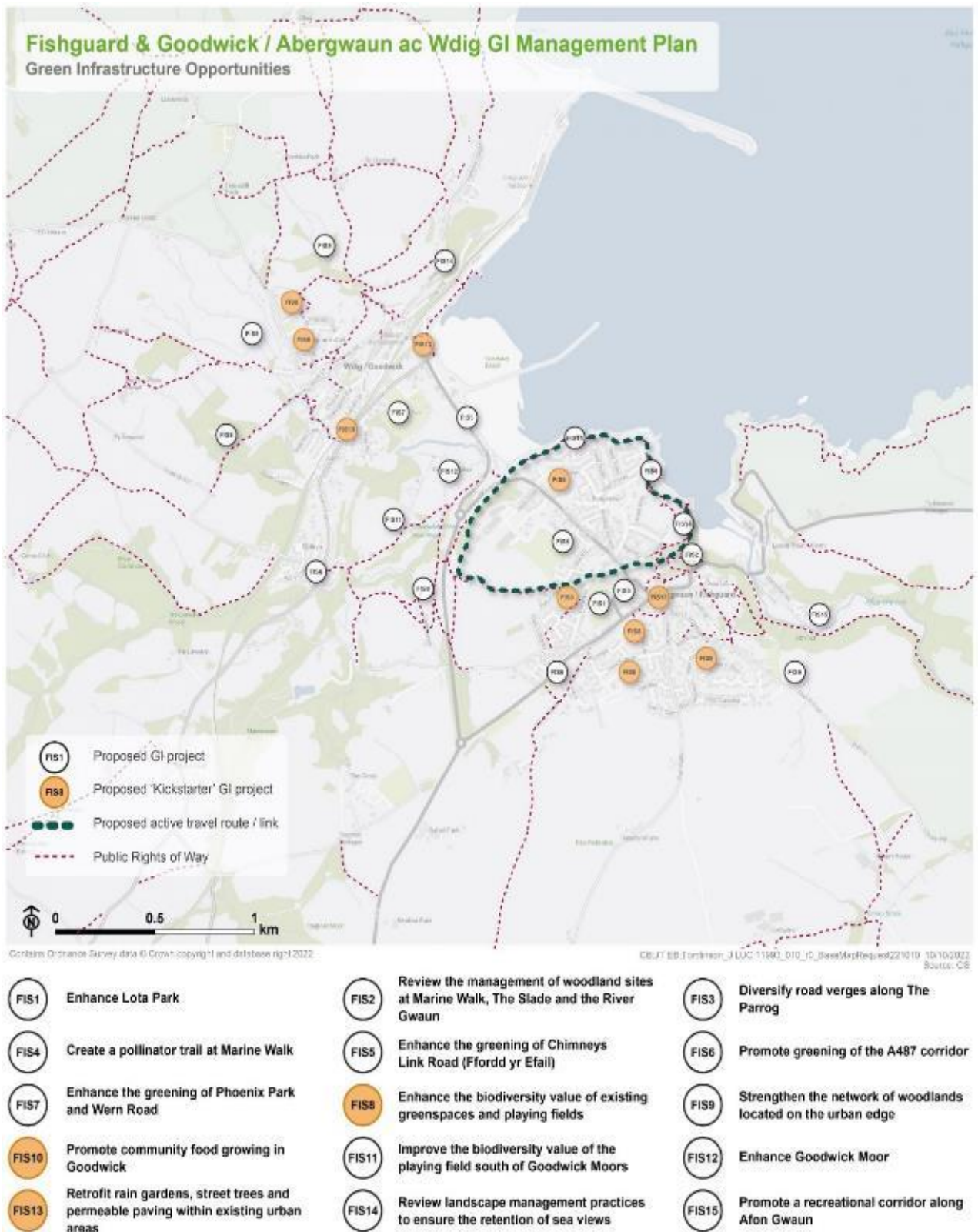
2.1 Fishguard and Goodwick are twin towns situated on the north Pembrokeshire Coast and are separated by a broad low-lying valley which hosts Goodwick Moor. The towns are situated along the clifftops and within the lower harbour which wraps around Fishguard Bay. The settlements retain much

of their maritime characteristics derived from their historic coastal setting. Bordered by the Pembrokeshire Coast National Park to the east and west, the settlements have strong recreation and transport links to the wider region, including the Pembrokeshire Coast Path, Fishguard and Goodwick railway station, and Fishguard ferry port.

2.2 Areas of open space within the settlements are concentrated in proximity to the coast and low-lying moorland, with stream corridors meandering toward the harbour from further inland. The stream corridors are heavily wooded and comprise numerous areas of ancient or semi-natural woodland. Across the low-lying moor area between the two towns lie public parks and a nature reserve, as well as some large wooded areas. Notable public spaces include Goodwick Moor Nature Reserve, Lota Park and Phoenix Park. Considered together, these spaces offer opportunities for strengthening recreation and wildlife linkages between the towns and the coastline.

2.3 The coastal clifftops of both Fishguard and Goodwick host important recreational and ecological assets. Cliffs on either side of Lower Fishguard Harbor are designated as Sites of Special Scientific Interest (SSSI) for their significant geologic value. The coastal corridor also hosts a section of the 186-mile Pembrokeshire Coast Path, a promoted National Trail. This footpath passes through and along the northern edge of the towns and provides a strategic link across the settlement cores and intervening open spaces. A network of Public Rights of Way (PRoW) and cycling routes branch off the Pembrokeshire Coast Path and follow the wooded stream corridors inland to provide further recreational opportunities.

Figure 2.2: GI Opportunities within Fishguard and Goodwick



Kickstarter Projects

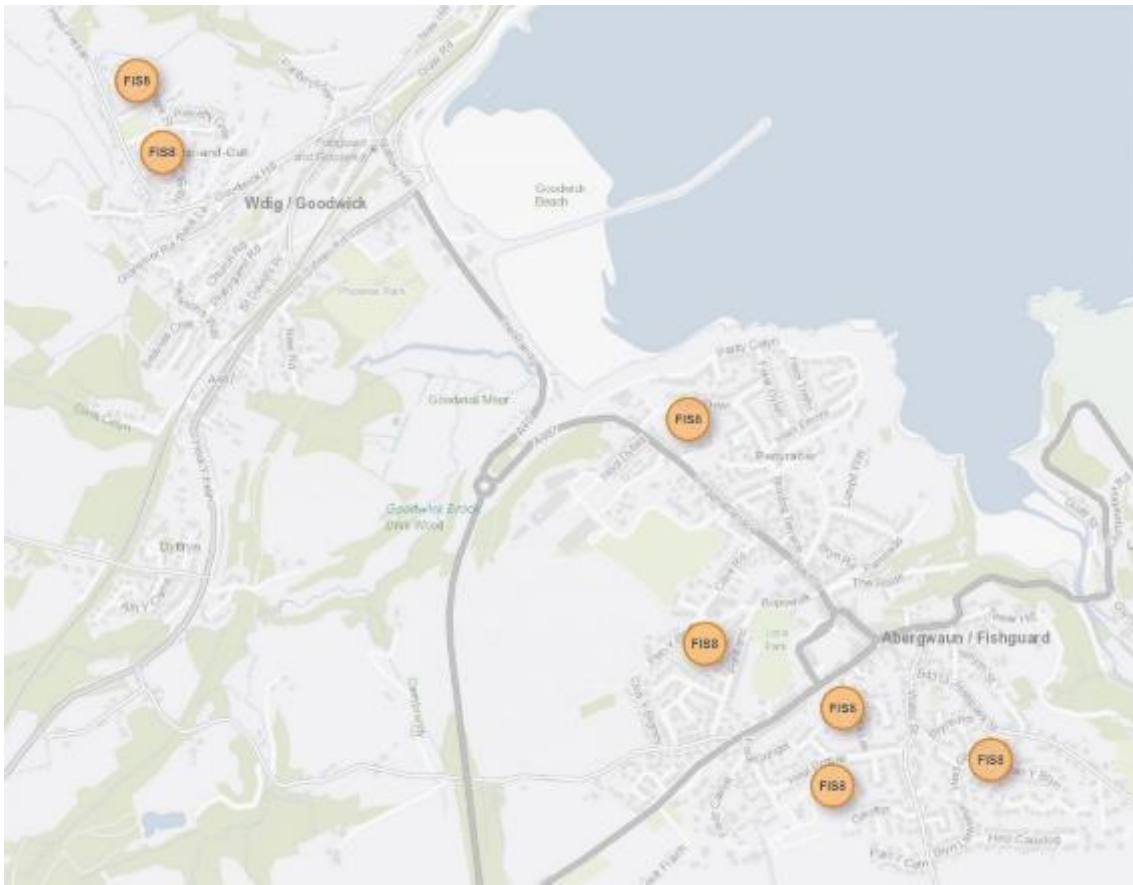
FIS8 – Enhance the biodiversity value of existing greenspaces and playing fields

2.4 A number of green spaces are dominated by large swathes of short mown amenity grassland which should be enhanced to promote increased biodiversity and recreational value. Examples include Maesgrug, Stop and Call playing fields, Heol Dewi, Fishguard Leisure Centre, amenity space at Pen-y-Bryn, St Mary's Field, Morfa Las and around Dan-y-Bryn.

2.5 One of the most straightforward methods of increasing biodiversity is to cut grass less often, mowing on rotation and collecting cuttings. However, wildflower seeding or plug plants should be added to enhance biodiversity value more quickly. Consideration should be given to sowing seed mixes with yellow rattle due to its ability to weaken vigorous grasses.

2.6 If greenspaces are used for recreation, enhancing the borders in sunny spots or creating pollinator friendly flowerbeds and borders along the margins offers the potential to allow greenspaces to serve both functions. Other options include the planting of native hedgerows, which provide food and shelter. The provision of areas for nature exploration, such as mown paths through species rich meadows, would help create space for people and nature.

Figure 2.3: FIS8 project



Benefits of the project

2.7 Benefits of the project, as depicted in Figure 2.4 below, include:

- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education & interaction with nature
- Social interactions & community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 2.4: Benefits



Delivery mechanisms

2.8 Wildflower meadow habitat significantly reduces the amount of time spent on grass-cutting during the growing season. Annual cuts of the meadow should be integrated into the work programme of the Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

2.9 Provision of pollinator habitat should be delivered in accordance with the delivery section of the Pollinator Strategy.

2.10 The delivery of successful tree planting schemes can be challenging and costly due to the time required for trees to reach maturity. The design of tree pits, the depth and soil used and the on-going watering and maintenance is vital in ensuring successful establishment.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- Tree Wardens Pembrokeshire
- Fishguard and Goodwick Town Council
- Fishguard Greening Group

- Pembrokeshire Nature Partnership

Outline cost

Low cost = <£250k

2.11 The cost of creating a wildflower meadow depends on the size and scale of the site. For small areas, it's relatively cheap to establish a small wild flower meadow. The cost of seed (lowland meadow perennial mixes) to cover 50 sq m ranges from £20-£30.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund

Timescale

Quick win = <1 year

2.12 Wildflower meadows could be delivered at a few key locations in the next planting season.

Medium-term = 1-5 years

2.13 The creation of native hedgerows or tree planting would take longer to grow and establish. Site implementation may need to be staggered to allow the necessary adjustments in management routines by PCC StreetCare / Amenity Maintenance Team.

Potential constraints

2.14 There may be local objection to the project if enhancements detract from the tidy and orderly appearance of the street. Signage and interpretation boards should help to mitigate this, but plans would need to be clearly communicated to local residents prior to installation.

2.15 Tree planting comes with challenges due to the challenges in ensuring successful establishment. Where tree pits cannot be dug into the ground due to existing services, consideration should be given to the use of suitably sized above ground planters.

Maintenance and stewardship

2.16 Community stewardship is particularly important throughout the initial establishment years (60 months) to ensure trees are sufficiently watered during dry periods and stakes loosened when required. Securing 'buy-in' with local community groups, for example the Fishguard Greening Group, should also increase the chances for successful establishment.

2.17 A wildflower meadow requires a cut and lift at the end of the season. This is typically in September. The arisings should ideally be left for seven days to shed seed before removing. A second cut and lift may be required in early spring to remove winter growth.

Monitoring for success

2.18 The survival rate of new planting and areas of meadow habitats established can be monitoring indicators for success. Once all biodiversity enhancements have been implemented, an annual community BioBlitz could be organised to record the variety of life in the greenspaces. Engaging with citizen science projects such as the UK Pollinator Monitoring Scheme or organising an

annual community BioBlitz at certain greenspaces can help involve local communities in monitoring efforts.

Next steps

2.19 Review the delivery sections of the Pollinator Strategy and Urban Tree Planting Strategy to review options for enhancing the biodiversity value of greenspaces.

2.20 Consult with PCC StreetCare / Amenity Management Team to reach agreement on which sites would be managed differently and how.

Figure 2.5: Fishguard and Goodwick



FIS10 – Promote community food growing in Goodwick

2.21 Adopt a community led approach to promote sustainable food growth within Goodwick. The facility should complement existing allotment provision within Fishguard, offering the opportunity for benefits to the physical and mental well-being of local people as well as improved social and community cohesion. The COVID-19 pandemic resulted in a surge in the uptake of at-home food growth, with the demand for allotments matching this trend. Furthermore, a number of Pembrokeshire’s allotment sites are at full capacity and experience considerable waiting lists. Therefore, new and inventive methods of delivering sustainable food growth practices should be considered – including community gardens, allotments or public planters. This could include community-led schemes, small-scale projects and new partnerships within the town itself.

2.22 The opportunity exists to work with the local community to identify a site for a community garden within Goodwick to meet the rising demand for outdoor growing by the community. Existing feasibility and site finding work undertaken by GRWP Resilience should be supported. The facility should also be delivered with input from the Greening Fishguard & Goodwick Group and the Tree Wardens Pembrokeshire volunteer scheme. The establishment of a community growing facility offers the potential to work in partnership with local schools to integrate sustainable food growth as part of the curriculum. Working in accordance with the objectives of the pollinator strategy for the town, the role spaces such as allotments can play in providing wildlife refuge through habitat creation and ecological management practices should also be explored.

Benefits of the project

2.23 Benefits of the project, as depicted in Figure 2.6 below, include:

- Investment and enhanced visitor experience
- Space for wildlife and ecological resilience

- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 2.6: Benefits



Delivery mechanisms

2.24 Allocation of under-used land within Goodwick for a community growing space, as part of housing delivery or identify areas of publicly owned green space to allocate for a community growing initiative.

Potential partners

- Allotment tenant groups
- GRWP Resilience
- Greening Fishguard & Goodwick Group
- Tree Wardens Pembrokeshire
- Pembrokeshire County Council (PCC)
- PCC Street Care / Amenity Maintenance Teams

- Incredible Edible Network
- The Federation of City Farms and Community Gardens – Community Land Advisory Service in Wales and the Growing Together project
- Wild About Pembrokeshire
- Local schools
- Developers

Outline cost

Low cost = <£250k

2.25 Delivery of the growing space could be relatively low cost once the land has been identified.

Potential funding opportunities

- Section 106
- Community Infrastructure Levy (CIL)
- Local Places for Nature Fund

Timescale

Medium-term = 1-5 years

2.26 Engagement with the community could begin quickly, however, the identification of suitable land and the delivery of the growing space will take a couple of years.

Potential constraints

2.27 Securing appropriate investment, site optioneering site finding and land ownership uncertainties would form significant challenges in the establishment of the community food growing facility.

2.28 Due to the stewardship challenges associated with the management of community resources in the long term, it is essential that management and maintenance is built into funding beyond the initial establishment phase. Appropriate ground preparation and soil testing are also key challenges to delivery.

2.29 The availability of resources within PCC and other stakeholders to promote and support community engagement and awareness at a local level is limited. As a consequence, successful community consultation would be essential to secure local 'buy-in' and would form a key component in the delivery of this project.

Maintenance and stewardship

2.30 The project would place a reliance on community groups at the local level for future management and maintenance of the community food growing facility. The opportunity also exists to manage the site to enhance biodiversity, delivering considerable benefits and improvements to local wildlife.

2.31 Additional support from the PCC StreetCare / Amenity Maintenance Teams should be provided to ensure the ongoing success of the space, both horticulturally and for wildlife.

Monitoring for success

2.32 The opportunity exists for PCC to integrate the site into future updates to the Well-being Plan, produced in response to the Well-being of Future Generations Act and monitor its future usage.

Next steps

2.33 A feasibility study should be undertaken to identify an appropriate site and initiate consultation. Soil testing should also be undertaken to inform the site selection process.

Figure 2.7: Fishguard and Goodwick.



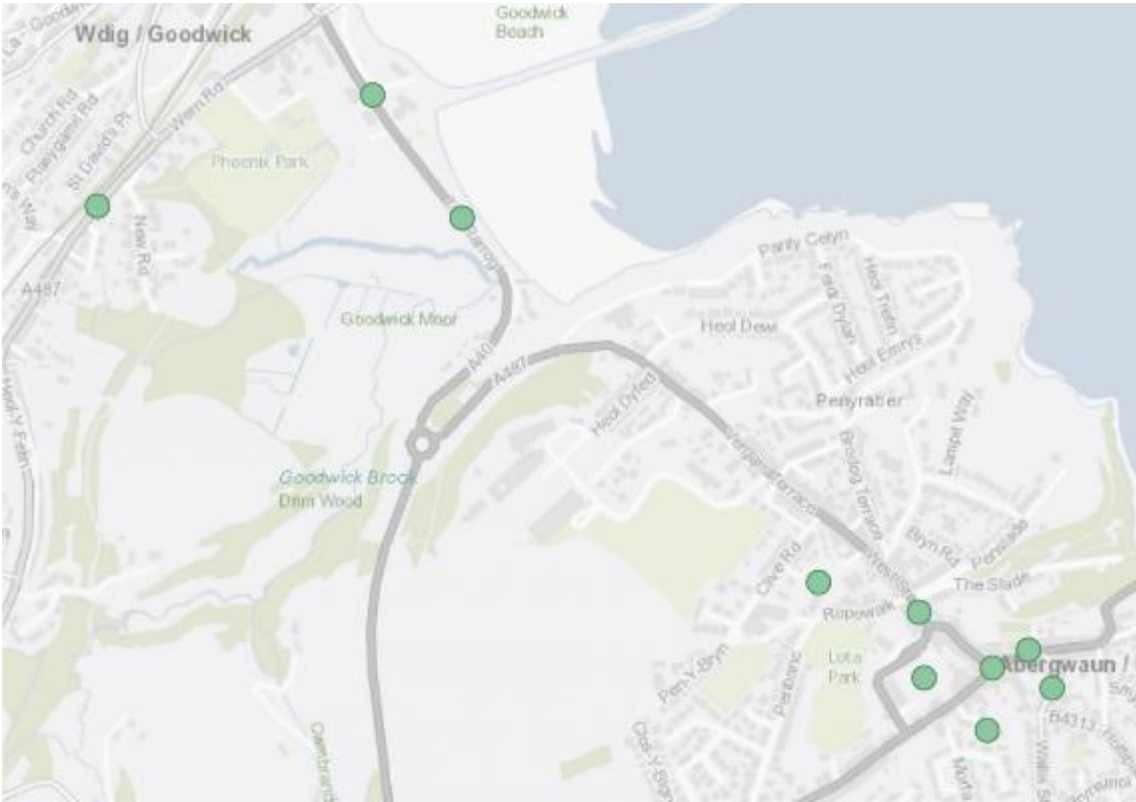
FIS13 – Retrofit rain gardens, street trees and permeable paving within existing urban areas

2.34 Fishguard has suffered from twin issues in the past, in the form of surface water flooding events and also incidents where foul sewage has overflowed and resulted in flooding (known as Combined Storm Overflows (CSOs)). These overflows originate from increased pressure on sewer systems due to the input of storm water to old sewage systems that take both rainwater and foul effluent. Large areas of impermeable land use, drained directly via pipes into the sewers and then rivers, exacerbate both of these issues. Implementation of Sustainable Drainage Systems (SuDS) interventions which divert storm water from combined sewers could reduce pressure on infrastructure, helping to reduce fluvial influence in times of flooding. Areas for potential intervention include:

- West Street Car Park
- Co-op food store
- Parc-y-Shwt Car Park
- High Street, West Street
- Main Street and Hamilton Street
- The Parrog and Manor Way in Goodwick

2.35 Fishguard's total town canopy cover is currently only 15.9%. Retrofitting SuDS interventions, such as street tree and rain gardens, would therefore offer benefits such as reduced surface run-off, enhancements to the aesthetic appearance of the area and improved air quality.

Figure 2.8: FIS13 project



Benefits of the project

2.36 Benefits of the project, as depicted in Figure 2.9 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Spaces for wildlife & ecological resilience
- Enhances air quality & noise regulation
- Reinforces a sense of place
- Urban cooling
- Improves health & wellbeing
- Carbon sequestration & climate change.

Figure 2.9: Benefits



Delivery of nature-based solutions and ecosystem services

2.37 The industrial and commercial expansion of Fishguard over recent decades has led to increased areas of hard landscape. The implementation of rain gardens, tree planting and permeable paving within these areas would improve the character of the townscape and introduce a sustainable approach to dealing with rainwater run-off.

2.38 SuDS interventions mimic drainage in nature where precipitation is absorbed into the ground, slowed by vegetation. The quantity and quality of water that ends up in local watercourses is therefore improved, helping to alleviate flooding and reduce CSOs. Sustainable management of water in urban areas also ensures towns are more resilient to the pressures of climate change and population growth.

Delivery mechanisms

2.39 An annual planting programme should be established to successfully plan, deliver and manage the new tree planting, rain gardens and permeable paving areas. Sufficient planning is required prior to the bare-root planting season

(October-March at the latest) to ensure ground checks / soil testing is completed.

2.40 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Local community
- Pembrokeshire County Council (PCC) Highways and Transport Department
- PCC StreetCare / Amenity Maintenance Team
- Local businesses
- Tree Wardens Pembrokeshire
- Dwr Cymru Welsh Water
- South Wales Trunk Road Agent (SWTRA)
- Fishguard and Goodwick Bay Conservation Group

Outline cost

Low cost = <£250k

2.41 Price is scalable depending on the number of trees planted / rain gardens created / permeable paving areas installed. However, a rough estimate of ~£10,000 to appropriately establish a tree within hard landscaping should be applied.

2.42 Costs would comprise some limited specialist advice including utility searches, stakeholder consultation and planting / maintenance costs. The costs

of installing permeable paving would be considerably higher. As a consequence, an initial focus should be placed on the implementation of rain gardens and tree planting.

Potential funding opportunities

- Transition Bro Gwaun grant funding (based in Fishguard)
- The Friends' Project Fund – Friends of Pembrokeshire Coast National Park
- Pembrokeshire County Council (PCC)
- Dwr Cymru Welsh Water
- Developer contributions
- National Lottery Community Fund
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council
- Nature Networks Fund
- Transforming Town Fund
- Natural Resources Wales (NRW) grants

Timescale

Quick win = <1 year

2.43 Tree planting and rain garden creation should be delivered at a few key locations in the next planting season.

Medium-term = 1-5 years

2.44 The majority of tree planting, rain garden creation and permeable paving aspects should be delivered across the next five planting seasons to allow for sufficient planning and engagement.

2.45 For initial planting and paving construction, this would be a quick win and could be implemented in less than a year. Subsequent carbon sequestration of the trees and associated vegetation would be limited initially but would increase within the next decade as the trees reach maturity.

Potential constraints

2.46 There are a considerable number of potential stakeholders to engage with for this project, with various landholders and the engagement process critical to the success of the scheme. PCC Highways and Transport Department and the SWTRA must be involved in the project.

2.47 The majority of the surfacing within the potential project area is characterised by hard landscape. The cost of excavating tree pits within hard landscapes is more expensive than within soft landscapes. Therefore, new tree planting must achieve the right balance between cost, space and desired function / design. In some circumstances, fewer trees with a larger rooting volume may be appropriate.

2.48 Within the urban environment, the potential for a variety of services and utilities to be located within potential planting areas and avoidance of these must be considered when accounting for the installation of tree planting. Rain gardens typically require shallower depths of installations and would therefore have a lower probability of conflict with services. There may be the potential for substituting tree planting in favour of rain gardens in areas identified to have a high probability of services.

2.49 New tree planting must also maintain key vistas. Therefore, all planting proposals should be prepared in conjunction with PCC.

Maintenance and stewardship

2.50 Establish a resident or commercial partner working group alongside PCC Street Care and Highways Department to take ownership of the new tree planting. A training day could provide the community with the tools and knowledge to successfully maintain new trees until establishment, including watering and checking tree stakes.

2.51 Watering and establishment care would be needed for the 60 month establishment phase to ensure trees are able to become independent in the landscape.

2.52 Permeable paving areas would need to be either adopted by PCC or by the relevant landowner.

Monitoring for success

2.53 Subject to the availability of funding, monitoring of the success of the project should be in conjunction with data from Dwr Cymru Welsh Water in terms of sewer capacity and reduction in CSO events.

2.54 Utilise the resident working group to monitor the successful establishment of new street trees and gardens. Establish a communication channel for reporting any issues or failures.

Next steps

2.55 Immediately identify landholders and commercial partners and engage with potential stakeholders, including SWTRA and the appropriate departments of PCC.

2.56 Survey the area to ascertain areas best suited for intervention.

2.57 Review the delivery section of the Urban Tree Planting Strategy to determine the process for planting trees within soft landscapes and understand the key components for successful tree establishment.

2.58 Engage residents and community groups to identify locations for tree planting and selecting species, using the species selection guide within the Urban Tree Planting Strategy.

Figure Error! No text of specified style in document..1: Fishguard and Goodwick



Project Long List

FIS1 - Enhance Lota Park

2.59 Introduce additional tree planting within Lota Park to enhance landscape character. Potential interventions include avenues along primary routes, large boundary trees, specimen parkland trees, orchard trees, flowering trees at key gateways, as well as the integration of small copses. The planting of fruit bearing trees along secondary routes, supplemented with plug planting around tree bases would provide an edible corridor. Focus tree planting in areas which suffer from waterlogging. Use of the embankment which separates the north and south of the park as a meadow should also be considered. The opportunity also exists to complement wider proposals for shared-use path linkages along High Street and Ropewalk, including wider connections to West Street, These routes are due to be implemented via Active Travel Funding.

FIS2 - Review the management of woodland sites at Marine Walk, The Slade and the River Gwaun

2.60 Create management plans for the woodlands at Marine Walk, The Slade and the River Gwaun to promote their long-term management. Interventions such as coppicing to enhance understorey structure and woodland thinning to maintain views / sightlines should be considered. Selective thinning should also be used as a mechanism to enhance the development of a diverse ground flora. Where feasible, tree groups should be planted at existing seating areas and to delineate entrances to Marine Walk. Consideration should be given to the implementation of proposals in conjunction with improvements outlined on the Active Travel Network Map, which aim to enhance Marine Walk and The Slade. A shared-use path is also proposed bordering the River Gwaun to provide linkages between Lower Fishguard and Llanychaer.

FIS3 - Diversify road verges along The Parrog

2.61 The verges at Goodwick Moor and The Parrog Road are currently characterised by short sward amenity grass. Working in conjunction with the Highway Authority, salt-tolerant wildflower meadows should be created to provide a pollinator corridor and improve the gateway into Goodwick. Similar wildflower meadows should also be established on the north eastern edge of The Parrog, with mown paths and glades to cater for the recreational use of the promenade. This intervention should be coupled with the planting of small tree groups and the renovation of existing shrub planting. Views to Goodwick Bay and Goodwick Moor should be promoted and maintained.

FIS4 - Create a pollinator trail at Marine Walk

2.62 Enhance wayfinding at Marine Walk, including signage along The Slade to provide direct connections from Fishguard town centre to Lower Fishguard Harbour. In areas of open amenity grassland and rest stops, planters should be installed as well as butterfly banks or bare earth areas. The route could be locally promoted as a 3km circular pollinator trail. Future aspirations should include the extension of the trail and the potential to achieve Bee Friendly Status similar to St Davids.

FIS5 - Enhance the greening of Chimneys Link Road (Ffordd yr Efail)

2.63 Several areas of greenspace exist at the new one way system (including pedestrian footways and shared-use path) adjacent to the Co-op. Interventions which diversify planting and enhance areas of short mown grassland should be explored alongside the upgrading of desire lines into formalised routes. Potential opportunities also include the management of areas which are awaiting development as 'meanwhile spaces', enhancing their pollinator value through wildflower planting. Consideration should be given to the introduction of

raised planters at the bus station and the use of green roofs on bus shelters / toilet blocks.

FIS6 - Promote greening of the A487 corridor

2.64 Introduce additional tree planting within existing grass verges along the A487 on the south west approach to Fishguard as well as on land to the south of Dyffryn. The aim should be to provide improved connectivity with the wider countryside and the creation of a gateway into the settlements. Plug planting around the base of trees should be considered as a mechanism to provide additional pollinator and visual interest.

FIS7 - Enhance the greening of Phoenix Park and Wern Road

2.65 Introduce boundary planting adjacent to the playing field and along roads / verges to provide a physical buffer between the open space and industrial context. This vegetation would also play an important role in ameliorating the negative perception of noise pollution from passing vehicles. The car park area to the east should be softened with tree planting and linear swales, with key access points delineated with additional tree planting.

FIS8 - Enhance the biodiversity value of existing greenspaces and playing fields

2.66 Refer to Kickstarter Projects.

FIS9 - Strengthen the network of woodlands located on the urban edge

2.67 Proposals which reinforce the existing pattern and network of woodland across areas immediately adjacent to urban areas should be explored, including the establishment of planting along watercourses and drainage networks.

FIS10 - Promote community food growing in Goodwick

2.68 Refer to Kickstarter Projects.

FIS11 - Improve the biodiversity value of the playing field south of Goodwick Moors

2.69 The potential exists to enhance the grassland margins of this field, currently utilised as a playing field. Proposals to improve the site for pollinators should include the implementation of a relaxed mowing regime and the sowing of wildflower seeds. Surrounding landowners should be consulted with the aim of creating a connected network of grassland margins to promote wider strategic linkages towards Goodwick Moor.

FIS12 - Enhance Goodwick Moor

2.70 Building on recent enhancements to public access at Goodwick Moor, proposals should aim to improve the range of pollinators. This would be achieved through the delivery of deadwood piles, controlling invasive species and enhancing the ecological value of habitat edges.

FIS13 - Retrofit rain gardens, street trees and permeable paving within existing urban areas.

2.71 Refer to Kickstarter Projects.

FIS14 - Review landscape management practices to ensure the retention of sea views

2.72 Landscape management practices should be reviewed to restore the availability of sea views, whilst balancing ecological and landscape considerations. Key locations include the south easterly facing slopes overlooking Goodwick Quay, sections of Marine Walk, Goodwick Moor as well as areas of public open space adjacent Penslade and The Slade. Selective woodland thinning operations also offer the opportunity to ensure pedestrian access routes and seating provision are preserved and reinstated where necessary. Effective delivery of this project would require consultation with South Wales Trunk Road Agent (SWTRA) and Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

FIS15 - Promote a recreational corridor along Afon Gwaun

2.73 Explore the opportunity to create a strategic recreational corridor stretching from the Wales Coast Path in Fishguard towards Cwm Gwaun, broadly following the route of Afon Gwaun. Fragmented sections of existing Public Rights of Way (PRoW) should be connected to provide an integrated pedestrian corridor.

Chapter 3

Haverfordwest

Figure 3.1: Haverfordwest



A Portrait of Haverfordwest's Green Infrastructure

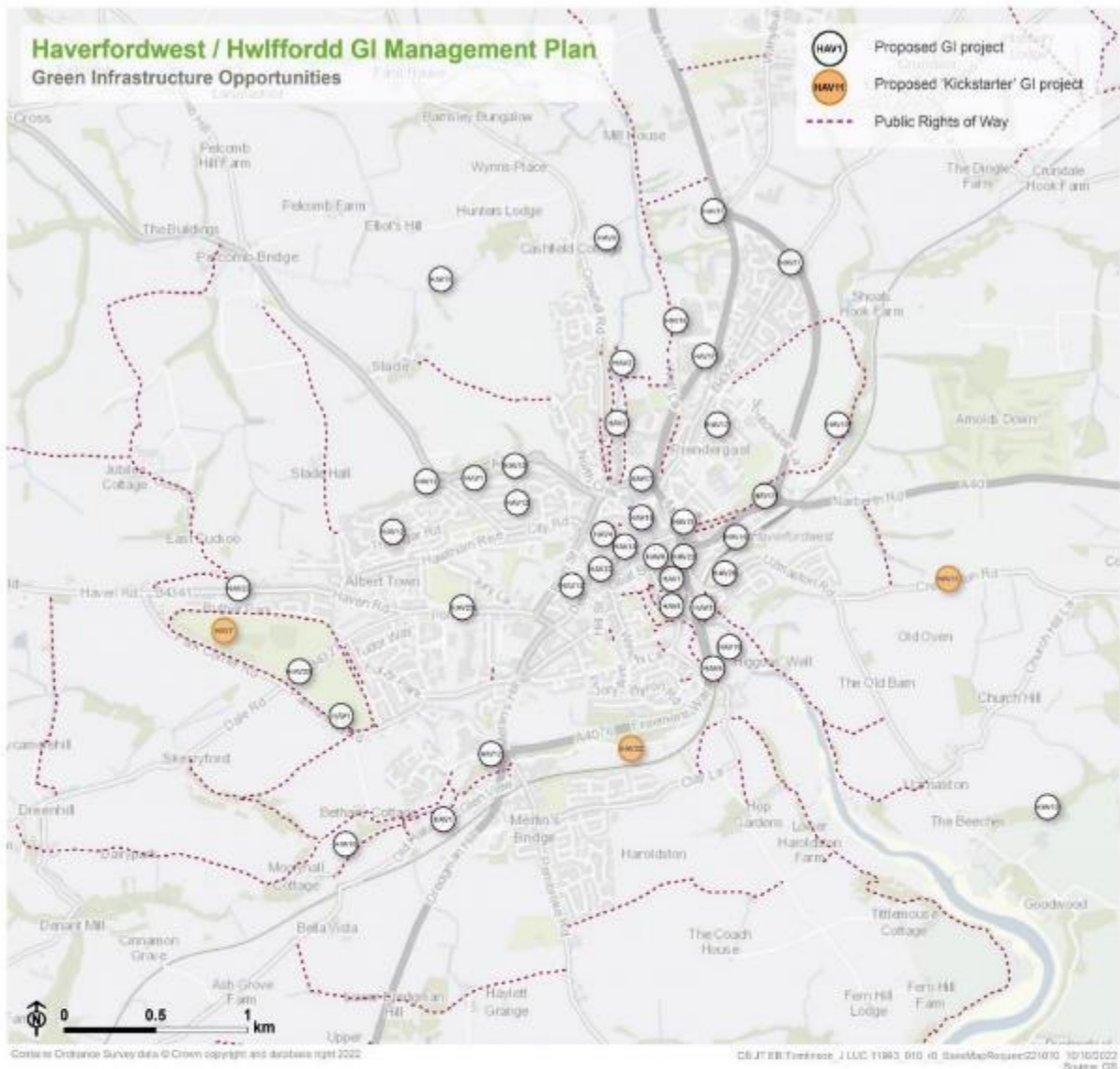
3.1 Haverfordwest is the largest town within Pembrokeshire with a population of over 15,000. The ancient town is home to numerous historic listed buildings concentrated in the settlement core, contained within the Haverfordwest

Conservation Area. Located inland towards the centre of the county, the town's rural periphery is characterised by hedgerow-bound pastoral fields.

3.2 The Western Cleddau river, which is designated as a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI), bisects the town north-south, and although areas of the river corridor are completely urbanised within the town centre, stretches remain relatively open. These sections provide intermittent walkable connectivity through the town core and out into the surrounding rural landscape, offering opportunities to connect with various nature reserves and Scheduled Monuments along the river corridor. Tributaries of the Western Cleddau include Merlin's Brook to the south and Fenton Brook to the east of the town. These watercourses provide additional wooded corridors and opportunities for wider access to nature. The river corridor is channelised through the urban centre but opens up into a wider floodplain in the north and south.

3.3 Public Rights of Way (PRoW) within the town centre are limited and generally contained along the river corridor and within wooded open spaces. Areas of public open space are generally located around the town centre and radiate outwards, allowing for some connectivity to the wider countryside. Although the existing PRoW network is somewhat disjointed, there are opportunities for improving overall connectivity. Cycle routes pass through the town along the main roads and join up with National Cycle Network (NCN) route 4 to the south-west of the urban centre. The Brunel Trail, also part of NCN route 4, offers an off-road cycle link between Haverfordwest and Neyland to the south.

Figure 3.2: GI Opportunities within Haverfordwest



- | | | |
|---|--|--|
| HAV1 Maintain and enhance the network of orchards | HAV2 Extend and enhance Bridge Meadow riparian environment | HAV3 Establish a community growing area for people and wildlife |
| HAV4 Manage the medieval 'burgage' gardens as a wildlife haven | HAV5 Enhance County Hall | HAV6 Maintain and enhance Priory Saltings Meadow |
| HAV7 Establish a racecourse parkland tree trail and promote wildflower meadow establishment | HAV8 Introduce orchard and parkland trees adjacent to the skate park | HAV9 Extend northern access along the Western Cleddau |
| HAV10 Introduce tributary walks at the Western Cleddau | HAV11 Establish a cycle path between Haverfordwest and Narberth | HAV12 Promote the greening of Haverfordwest's residential areas |
| HAV13 Incorporate proposals within the Haverfordwest AQMA | HAV14 Promote the greening of Castle Square | HAV15 Enhance riverside greening |
| HAV16 Greening of the train station | HAV17 Enhance green gateways | HAV18 Promote greening and social prescribing at Withybush Hospital |
| HAV19 Introduce a southern crossing of the Western Cleddau and enhanced access to Priory Saltings Nature Reserve | HAV20 Review street tree care | HAV21 Extend and enhance Scotchwell Woodland |
| HAV22 Create wetlands adjacent to the sewage treatment works | HAV23 Soften key existing routes into the town centre using tree planting | HAV24 Integrate SuDS interventions into the street scene |

Kickstarter Projects

HAV7 – Establish a racecourse parkland tree trail and promote wildflower meadow establishment

3.4 The Haverfordwest Racecourse Public Park is a valued community asset and provides an excellent opportunity to engage the wider public on the value of trees. The site also offers the potential to deliver an educational resource relating to the benefits, diversity and importance of trees within the town. A site-wide tree trail masterplan should be developed which promotes the multi-functional benefits of trees, whilst delivering space for fitness trails and active lifestyles. In addition, a cut and collect tractor and mower should be utilised to remove arisings and promote the establishment of newly sown wildflower meadows on the site.

3.5 Interventions should be delivered in combination with interpretation (potentially including digital interpretation) for all ages. This could include tree labelling as a mechanism to provide information relating to tree species diversity, the importance of trees for climate change mitigation and the promotion of biodiversity.

Figure 3.3: HAV7



Benefits of the project

3.6 Benefits of the project, as depicted in Figure 3.4 below, include:

- Reduces the risk of flooding
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education & interaction with nature
- Enhances air quality & noise regulation
- Social interactions & community cohesion
- Reinforces a sense of place
- Urban cooling
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 3.4: Benefits



Delivery mechanisms

3.7 An overarching tree planting strategy and masterplan promoting delivery over one season or several planting seasons should be developed. This would need to take account of site conditions, existing tree stock, grassland species, existing site use and access as well as opportunities for enhanced management of existing areas of woodland.

3.8 A preliminary ecological survey should be undertaken to determine the quality of existing grassland at the site and assess suitability for tree planting and the establishment of wildflower meadow. Additional tree planting should not be undertaken in areas identified as exhibiting high floristic diversity. Options for diversifying marginal grassland areas would likely include; cultivating and seeding discrete areas, modifying the existing mowing regime (including annual removal of arisings) and plug planting into existing grass sward (likely only practical over small areas).

3.9 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Haverfordwest Racecourse Public Park Trust

- Local community
- Pembrokeshire County Council (PCC) Highways and Transport Department
- PCC StreetCare / Amenity Maintenance Team
- Local businesses
- Tree Wardens Pembrokeshire

Outline cost

Low cost = <£250k

3.10 Costs would comprise some limited specialist advice including development of a masterplan & planting strategy, stakeholder consultation and planting / maintenance costs. Costs of developing interpretation would be dependent on viability and the ambitions of the Haverfordwest Racecourse Public Park Trust.

Potential funding opportunities

- Pembrokeshire County Council (PCC)
- National Lottery Community Fund
- Local Places for Nature Fund
- The Tree Council
- Natural Resources Wales (NRW) grants

Timescale

Quick win = <1 year

3.11 Some initial tree planting could be undertaken during the next planting season.

Medium-term = 1-5 years

3.12 The majority of tree planting, development of interpretation and community engagement should be undertaken over several planting seasons.

3.13 Subsequent carbon sequestration of the trees and associated vegetation would be limited initially, but would increase within the next decade as the trees reach maturity. Depending on the techniques employed and site conditions, the diversification of grassland areas would likely be undertaken over several seasons.

Potential constraints

3.14 A range of stakeholders would need to be engaged to inform an appropriate masterplan and planting strategy for the site. This should include existing users, including sports groups using the grass pitches.

3.15 Whilst tree planting would likely be small scale, advice should be sought as to whether any permissions or consents would be required.

3.16 As there are already notable areas of woodland present on the site, it is reasonable to assume that all areas would generally be suitable for tree planting. However, ecological and feasibility surveys should inform the location of trees and any grassland seeding.

Maintenance and stewardship

3.17 The project presents a notable opportunity for promoting community stewardship and management of trees / grassland areas. The project would ideally involve community training on tree identification, planting and maintenance. Depending on the scale of tree planting, some contractor support for establishment of trees, such as watering, checking stakes etc. may be appropriate and could be built into any funding applications.

3.18 Watering and establishment care would be needed for the 60 month establishment phase to ensure trees are able to become independent in the landscape. A high level management plan for the new planting would ideally be adopted and include removal of tree protection (tree guards / stakes) once trees are fully independent in the landscape (after approximately five years). Allowance should be made for some losses of new trees and provision for replacement planting. Grassland mowing regimes would need to be adjusted to account for areas that are being diversified. Arisings should be removed and disposed of, either offsite, or at a suitable area onsite for composting.

Monitoring for success

3.19 Success could be monitored through early stage and follow up species surveys for grassland areas, the number of trees planted and successful establishment. Monitoring of community engagement should involve a review of volunteer participation, attendance at training days and use of the site through simple visitor surveys.

Next steps

3.20 Undertake feasibility and ecological surveys of the area to ascertain areas best suited for the various interventions. This should include site conditions, existing tree and grassland species.

3.21 Review the delivery section of the Urban Tree Planting Strategy to determine the process for planting trees within soft landscapes and understand the key components for successful tree establishment.

3.22 Engage residents and community groups to identify locations for tree planting and the selection of species, using the species selection guide within the Urban Tree Planting Strategy. Consultant support should be commissioned, where required, for the development of the masterplan / planting strategy and interpretation.

Figure 3.5: Haverfordwest



HAV11 – Establish an integrated cycle path between Narberth, Haverfordwest and Neyland

3.23 The opportunity exists to extend the existing route of the Brunel Trail, linking Neyland to Haverfordwest, to provide a predominantly off-road cycle route connecting eastwards towards Narberth. Recently upgraded multi-user paths emerging from Town Moor car park in Narberth currently provide a connection to Blackpool Mill, via the lowland landscape parallel to the Cleddau River. However, an optioneering exercise and feasibility study should be undertaken to determine a preferred route to deliver the ‘missing link’ in the route between Blackpool Mill and Haverfordwest. Working in conjunction with Pembrokeshire County Council (PCC), proposals would need to resolve access issues across privately owned land at Slebech Park, where existing Public Rights of Way (PRoW) are currently absent.

3.24 Consideration should be given to the incorporation of a range of street furniture, interpretation, signage and incidental natural play features along the route to enhance the corridor as a recreational asset. However, the implementation of any lighting proposals would need to be undertaken in liaison with an ecologist to ensure the correct balance is reached between the perception of safety and biodiversity considerations. This would be carried out as part of a wider ecological assessment to determine specific ecological sensitivities of the proposed site and any requirements for mitigation. Working in conjunction with conservation groups and local voluntary groups, conservation activities would not only enhance the nature value of the route, but also promote active lives and positive mental wellbeing through community cohesion.

Figure 3.6: Route between Nabert, Haverfordwest and Neyland



Benefits of the project

3.25 Benefits of the project, as depicted in Figure 3.7 below, include:

- Provides active travel opportunities
- Investment and enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 3.7: Benefits



Delivery mechanisms

3.26 A grant application would be required to secure funding for the capital works associated with this project. The route would need to be identified on the Integrated Network Map to be considered eligible for funding.

Potential partners

- Active Travel team, forming part of the Transport Strategy Unit at PCC

Outline cost

High cost = <£1 million

Potential funding opportunities

- Welsh Government Active Travel Fund Grant
- PCC
- Transport for Wales

Timescale

Medium-term = >5 years

3.27 To complete the route in full, it will likely take over 5 years to deliver.

Potential constraints

3.28 The project is likely to be complex, with competing demands including the requirement for significant external funding and liaison with local landowners. It would be necessary to engage with landowners and land occupiers in order to present the project and discuss any impacts on current land-use. However, a key unknown for the project would be the time needed to gain these landowner consents.

3.29 The upgrading of existing routes to provide a multi-user route for cyclists would also require localised vegetation clearance along some sections of the route. This would need to be undertaken to avoid the bird nesting season and in liaison with an ecologist or Ecological Clerk of Works (ECoW).

3.30 In order to fulfil the criteria of the Welsh Government Active Travel Fund Grant, the scheme design would need to ensure it is consistent with the principles of the Active Travel (Wales) Act 2013 and the supporting Active Travel Act Guidance. Schemes that include highway improvement, construction, or traffic management must show how they comply in particular with Section 9 of the Act (Provision for walkers and cyclists in the exercise of certain functions).

Maintenance and stewardship

3.31 Ongoing annual maintenance of the hard surfacing of the route would be required to ensure access is maintained throughout the year. Landscape management works would also be required to ensure the retention of sightlines across the route.

Monitoring for success

3.32 The opportunity exists to install sensors or counters to monitor the usage of the route as part of the wider active travel network within the county. This approach would help measure the success of the substantial investment and inform the long-term strategy and delivery of similar projects in the future.

Next steps

3.33 Undertake a feasibility study and optioneering exercise to determine a proposed route. This exercise should incorporate an ecological assessment and tree survey to BS5837: 2012 to examine the implications on local biodiversity and existing tree cover. A street furniture and signage strategy for the route should also be developed. Furthermore, a comprehensive process of consultation and engagement would be required to determine the appetite for conservation days along the route.

Figure 3.8: Haverfordwest

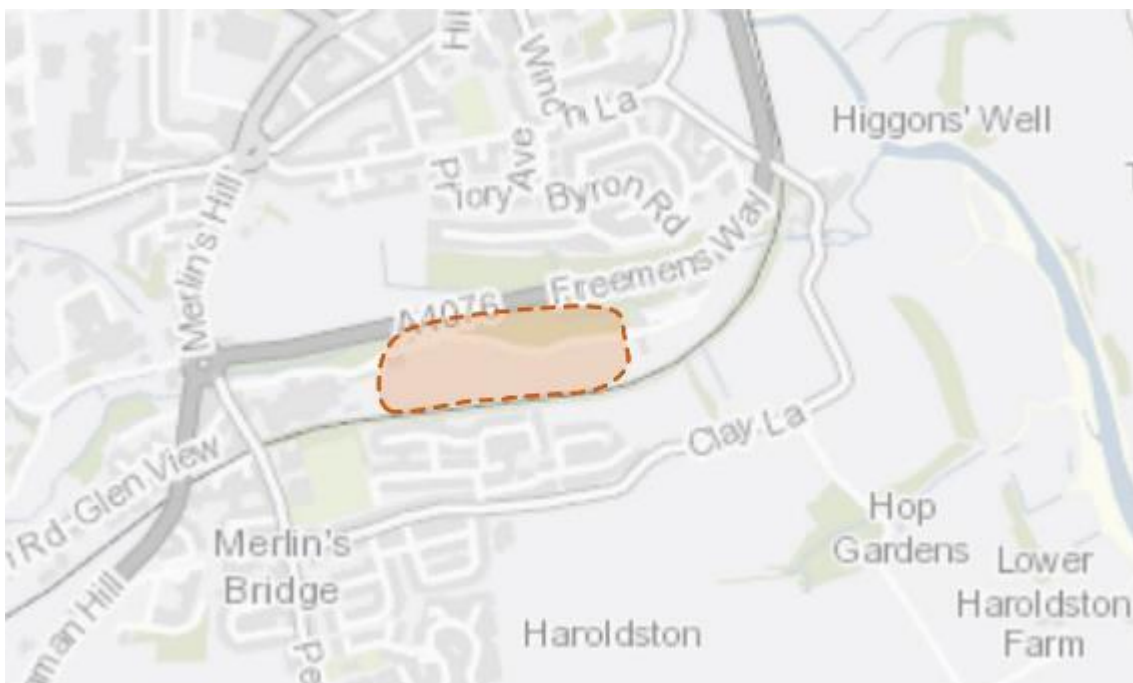


HAV22 – Create wetlands adjacent to the sewage treatment works

3.34 South of Haverfordwest lies a Dwr Cymru Welsh Water sewage treatment works adjacent to Merlin's Brook. This site lies within Flood Zone 2 and 3, with several historic combined storm overflow events (where foul effluent, mixed with rainwater is released into the river due to the capacity of infrastructure being exceeded). Dwr Cymru Welsh Water recorded a total of 847.25 total hours of spills in 2021 alone. These spills feed into Merlin's Brook which drains into the Western Cleddau River, a designated Special Area of Conservation that is currently failing the new phosphate criteria. Phosphate, whilst naturally occurring, can also result from human activity such as sewage effluent. Elevated levels of phosphate lead to eutrophication of rivers which can cause significant ecological damage. The Western Cleddau supports populations of brook lamprey, river lamprey, bullhead and otters, all of which decline with decreasing water quality.

3.35 The creation of new wetlands on vacant land next to the sewage treatment works would provide increased treatment capacity to help remove phosphates from the treated sewage effluent as it exits the site. This intervention would also provide a buffer for both flood alleviation and combined storm overflow events, reducing the degree to which raw untreated sewage flows directly into the brook. The wetlands would aid nutrient stripping of the outfall and this in turn would help reduce phosphate levels in the Western Cleddau River.

Figure 3.9: HAV22 project



Benefits of the project

3.36 Benefits of the project, as depicted in Figure 3.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhances visitor experience
- Spaces for wildlife & ecological resilience

- Enhances air quality & noise regulation
- Improves health & wellbeing
- Carbon sequestration & climate change.

Figure 3.10: Benefits



Delivery of nature-based solutions and ecosystem services

3.37 Wetlands can aid flood alleviation, acting as a store of excess water in periods of heavy rainfall in addition to their primary function of nutrient stripping and cycling. These habitats also provide multiple biodiversity benefits.

3.38 Constructed wetlands, if designed correctly, can achieve sustainable effluent treatment that provides a reduction in contaminant concentration similar to more complex chemical-based or mechanical mechanisms. The effluent from sewage treatment facilities is typically rich in nutrients and wetlands can be used to help alleviate this issue in a sensitive areas such as the Western Cleaddau River SAC.

Delivery mechanisms

3.39 An appropriate design engineer should be consulted to provide a design of the wetlands. The potential area for the wetlands should be calculated and agreed with relevant landowners. Consultation with the local community should be undertaken to enable engagement with the plans. Contractors required to scope out the topography and excavate selected areas should be employed. Consideration of materials needed to create the wetlands such as substrate materials and vegetation should also be sourced as locally as possible.

3.40 It may be possible to incorporate solutions such as this into developer contributions (e.g. under Section 106 agreements) that enable developers to offset the increased nutrient loading associated with new developments, thus providing a funding mechanism for the wetland's construction and maintenance.

Potential partners

- Natural Resources Wales (NRW) Projects for Cleddau Rivers – Natural Flood Alleviation
- The Four Rivers for LIFE project
- Wildlife Trust of South & West Wales
- Cleddau SAC Nutrient Management Plan Board
- West Wales Rivers Trust

Outline cost

Low cost = <£250k

3.41 Costs would comprise land purchase or rent, specialist engineer design of the wetlands, procurement of planting and costs associated with excavation and installation of the wetlands.

Potential funding opportunities

- Dwr Cymru Welsh Water
- The Four Rivers for LIFE project
- Nutrient credits using Section 106 agreement
- Ofwat Innovation Fun

Timescale

Medium-term = <1-5 years

3.42 This anticipated programme length includes for time to enable design of the wetland, agreements with landowners, construction and planting of the wetland.

Potential constraints

3.43 A key constraint for the project would be securing landowner agreements. It would also be essential to ensure the wetlands are located adjacent to the sewage treatment infrastructure to avoid re-routing sewage outfalls that would increase time and costs of the project. Antibiotic-resistant bacteria accumulation

in wetlands is a concern and should be considered in the design of the wetlands.

3.44 An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Maintenance and stewardship

3.45 Wetlands are fairly low maintenance with little to no running costs as they do not require power and are generally reliable self-adjusting systems. However, maintenance would be required a few times a year to remove debris from any outlets, replace any damaged pipes, remove any invasive plant species that may be outcompeting the wetland plants, reduce sediment accumulation and check the structural integrity of the structural aspects of the design. Ongoing agreements with Dwr Cymru Welsh Water or landholders for access would be crucial.

Monitoring for success

3.46 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science. Techniques could include monitoring of water quality using simple hand-held equipment.

Next steps

3.47 This project would require collaboration with Dwr Cymru Welsh Water and so the first step would be to explore and set in place a collaboration agreement. This may help unlock funding from Dwr Cymru Welsh Water themselves, or from Offwat Innovation Fund or similar. Thereafter, a scoping exercise should be undertaken to define the requirements of the scheme in terms of the range of

outflows from the sewage works, the space available for construction and landowner considerations.

Project Long List

HAV1 – Maintain and enhance the network of orchards

3.48 Continue the legacy of Transition Haverfordwest’s Orchard Mawr project through ongoing management of Merlins Bridge Orchards, Fleming Crescent Orchards and Racecourse Orchards. The establishment of fruit trees by the skate park and the extension of planting along the grassy verges of the Parade / tennis courts should also be explored.

HAV2 - Extend and enhance Bridge Meadow riparian environment

3.49 Complement wildflower areas along the extent of the Western Cleddau reaches by extending areas of wet meadow along the floodplain. This would support wider biodiversity objectives through the inclusion of wader scrapes and areas of wet woodland, reinforcing the habitat corridor. The area has been identified by Natural Resources Wales (NRW) as an area for floodplain reconnection potential and would help provide a natural flood attenuation area upstream of the town.

HAV3 - Establish a community growing area for people and wildlife

3.50 The opportunity exists to create an area of community allotments, fulfilling a vital role in connecting people to the process of food production. Where possible, planting margins should be left uncut, sheds fitted with living roofs and bird feeders added to attract wildlife. The intervention should encourage plot owners to reduce the use of pesticides and herbicides, instead choosing to work the land organically. Additional tree and orchard planting opportunities should also be explored.

HAV4 - Manage the medieval 'burgage' gardens as a wildlife haven

3.51 The Haverfordwest Castle burgage plots are currently managed as a wildlife haven, with more than 18 different types of wildflower plants, hedgehog hideaways, bird and bat boxes. By supporting a variety of species, the burgage plots not only are an attractive visitor destination, but they also help demonstrate the importance of interconnected food webs. Continued management is recommended to ensure that the site continues to be a place for people and wildlife to enjoy.

HAV5 - Enhance County Hall

3.52 The opportunity exists to re-plant the redundant window boxes at County Hall with native flowers to enhance biodiversity. Wildflower seeds should also be sown and plug plants introduced in the verges at ground level to provide additional value to pollinators. Planting proposals which aim to enhance biodiversity should also be integrated within proposals to improve the link between Picton Place and the Clock Tower.

HAV6 - Maintain and enhance Priory Saltings Meadow

3.53 Formerly a household waste recycling centre, Priory Saltings is now a thriving nature reserve. The meadow grassland should continue to be managed through mowing and gathering seed rich hay between late August and September. This operation encourages a traditional hay meadow to establish that is rich in flowering perennials. The site should also continue to promote events such as Pembrokeshire Meadows Open Day to encourage local awareness and engagement. Areas of bare ground and wetter areas should be enhanced to provide for pollinators throughout their life cycle. Consideration should also be given to improved wayfinding and interpretation signage, including the potential to provide an all-weather accessible link between the site and The Priory.

HAV7 - Establish a racecourse parkland tree trail and promote wildflower meadow establishment

3.54 Refer to Kickstarter Projects.

HAV8 - Introduce orchard and parkland trees adjacent to the skate park

3.55 Explore the opportunity to introduce tree planting adjacent to the skatepark to complement the network of existing fruit trees. Planting parkland trees would also help to reinforce the townscape and landscape character of the area, whilst delivering a range of multi-functional benefits. Working in conjunction with Haverfordwest Skatepark Association, the opportunity exists to deliver a

community tree planting event to encourage local buy-in of the proposals and promote community ownership.

HAV9 - Extend northern access along the Western Cleddau

3.56 Extend and connect Old Mill Ground Nature Reserve to facilitate sensitive access to nature. Building on the recent footbridge which crosses the Western Cleddau at this location, the installation of additional access northwards (subject to landowner approval) should be explored. This should be coupled with direct access towards communities at Cashfield where the opportunity exists to create a circular recreational route. Additional tree planting to increase strategic canopy cover, whilst delivering nature-based solutions to flooding, should also be incorporated into future landscape proposals.

HAV10 - Introduce tributary walks at the Western Cleddau

3.57 Explore opportunities for circular walks which connect the centre of Haverfordwest with the surrounding countryside and Pembrokeshire Coast National Park. The routes should utilise some of the Western Cleddau's tributaries (including Merlin's Brook, Cartlett Brook and Pelcomb Brook).

HAV11 - Establish an integrated cycle path between Narberth, Haverfordwest and Neyland

3.58 Refer to Kickstarter Projects.

HAV12 - Promote the greening of Haverfordwest's residential areas

3.59 Supplement and enhance existing woodland buffers within the north west of Haverfordwest, utilising large areas of amenity grassland adjacent to residential areas. Additional habitat creation interventions, including wildflower meadows, should also be explored within locations such as Thomas Parry Way, Fleming Crescent, Trafalgar Road and the estate at Scotchwell View. In addition, the integration of greening initiatives within the green space at Tan Bank should be delivered in conjunction with proposals to introduce a footway to connect Cardigan Road with Prendergast School. An opportunity to review the landscape management of Fleming Crescent Woodland should also be explored.

HAV13 - Incorporate proposals within the Haverfordwest AQMA

3.60 Review parking provisions to accommodate space for raised planters and street tree planting. This intervention should be coupled with the potential for planting on grass verges, for example at Milford Road. Trees should also be used to define key routes between key destinations and visitor attractions within the town.

HAV14 - Promote the greening of Castle Square

3.61 Introduce soft landscape interventions within Castle Square to provide an attractive public space. Street trees with incorporated seating should be used to provide shade, alongside raised planters with incorporated bike parking, electric bike charging and sociable seating arrangements. Features utilised within

Castle Square should form part of a repetitive set of street furniture across the town. Urban greening and signage should also be used to create a more welcoming route to the car park. Consideration should also be given to the installation of additional cycling and electric bike facilities.

HAV15 - Enhance riverside greening

3.62 A concentration of Combined Sewer Overflow (CSO) events are located within close proximity to Riverside Shopping Centre. Bridge Meadow Retail Estate has also previously recorded flood events. Therefore, the implementation of trees, permeable paving, raised planters, seating and rain gardens within the public realm and car parks should be explored. Supported by appropriate maintenance and management programmes, floating reedbeds should also be used to soften the channelised edge of the river with the aim of enhancing water quality and provide riparian habitats. Green walls, green bus stops and greening features should be delivered along the multi storey car park to the north east of the shopping centre.

HAV16 - Greening of the train station

3.63 Enhance the sense of arrival within the town through small scale street tree planting and urban greening features; including raised planters, green cycle parking and green bus stops. This should be complemented with enhanced wayfinding to promote the town's key attractions as well as seating provision and electric bicycle charging stations.

HAV17 - Enhance green gateways

3.64 Deliver attractive and pollinator-friendly green gateways to Haverfordwest at key entrance points, car parks and roundabouts. Potential locations include Withybush Roundabout, Cardigan Road Roundabout, Brigend Square Roundabout, Salutation Square Roundabout, Merlins Bridge Roundabout,

Slade Roundabout, and Scotchwell Roundabout as well as both public and private car parks. Alongside planting improvements, consideration should be given to junction approaches and how these can be improved to promote increased usage by pedestrians and cyclists (whilst allowing for appropriate visibility splays).

HAV18 - Promote greening and social prescribing

3.65 Work in partnership with Withybush Hospital, South Pembrokeshire Hospital, Tree Wardens Pembrokeshire and Local Places for Nature to progress landscape design proposals for therapeutic gardens. These spaces should aim to deliver gardens for quiet relaxation and promote a greater connection with nature for patients and staff. Opportunities for gardening and small-scale food growth should also be explored. The potential also exists to support Pembrokeshire College in the development of proposals for a food growing area for life skills learners as well as a well-being garden at its site at Withybush. Long-term aspirations should involve a direct active travel connection between the Withybush Hospital and Crowhill Road via the Western Cleddau footbridge.

HAV19 - Introduce access improvements to improve connections between the Western Cleddau and Priory Saltings Nature Reserve

3.66 Explore future options for access enhancements to Priory Saltings Nature Reserve from the Western Cleddau. Options include improvements to the existing road bridge from Picton Fields or a new southerly crossing of the Western Cleddau. These links would aim to connect Priory Saltings Nature Reserve, Fortune's Frolic footpath as well as the wider Public Rights of Way (PRoW) network. Links from the A4076 to Priory Saltings Nature Reserve, including the provision of circular route options in the south of Haverfordwest,

should also be explored. In addition, the opportunity exists to explore new shared-user path proposals connecting Merlin's Bridge along Clay Lane to Union Hill.

HAV20 - Review street tree care

3.67 Review the setting of existing street trees and their ongoing care. To promote their long term establishment, existing areas of asphalt concrete should be broken-out at the base of the street tree to allow for the passage of air and water. Installation of new street trees should follow best practice use of tree pits, guards and grilles (where appropriate).

HAV21 - Extend and enhance Scotchwell Woodland

3.68 Review the management of Scotchwell Woodland to promote positive management practices; ensuring appropriate thinning, coppicing and invasive species removal. Consideration should also be given to the introduction of new trees at the amenity greenspace at Cherry Grove and Mill Bank to expand connectivity of the woodland and enhance the structured woodland edge hierarchy. Proposed access improvements, in accordance with the Active Travel Network Map, should also be delivered.

HAV22 - Create wetlands adjacent to the sewage treatment works

3.69 Refer to Kickstarter Projects.

HAV23 - Soften key existing routes into the town centre using tree planting

3.70 Introduce tree planting along key routes to soften the approach into the town centre and address the gaps in strategic canopy cover, whilst also softening urban edges. Potential locations include the A4076 corridor, B4341 Haven Road, B4327 Dale Road and High Street. The management of existing street trees should also be re-examined, ensuring tree stakes, grilles and guards are removed or re-tied to accommodate growth.

HAV24 - Integrate Sustainable Drainage Systems (SuDS) interventions into the street scene

3.71 The urban street scene offers the opportunity to integrate various Sustainable Drainage Systems (SuDS) interventions and tree planting as a mechanism to help reduce the volume of surface water which is directly channelled through a network of pipes. The potential also exists to work in conjunction with Haverfordwest Town Council to explore locations for SuDS interventions within the townscape.

Chapter 4

Milford Haven

Figure 4.1: Milford Haven



A Portrait of Milford Haven's Green Infrastructure

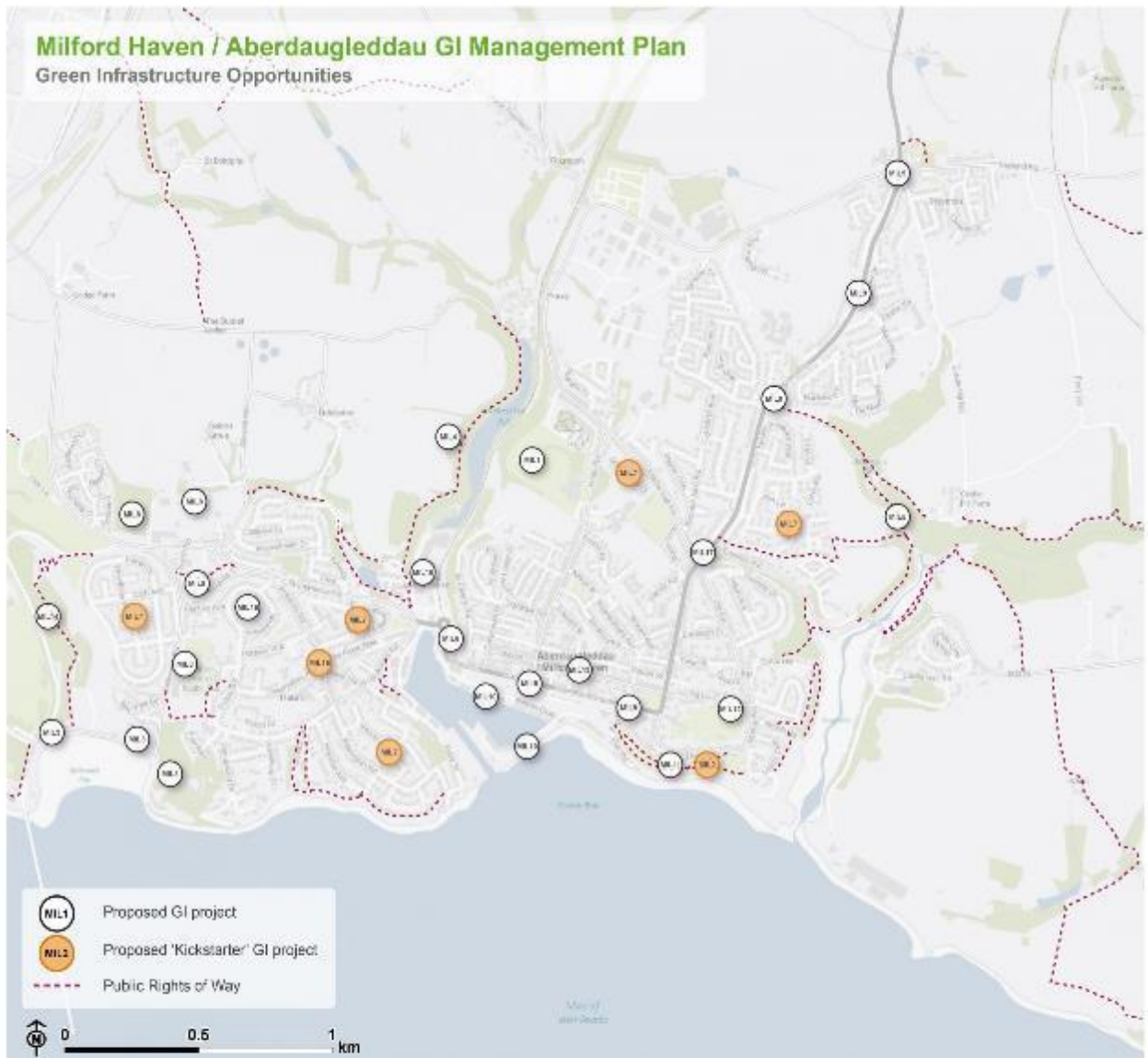
4.1 Milford Haven is a historic industrial town in the south of Pembrokeshire. The settlement is located on the northern shore of Milford Haven, one of the deepest natural harbours in the world and which forms part of the Pembrokeshire Marine Special Area of Conservation (SAC). Significant

stretches of the estuary's coastline are also designated under the Milford Haven Waterway Site of Special Scientific Interest (SSSI). Originating as a whaling port, Milford Haven and the wider estuary have since developed into a nationally important shipping hub for oil and gas, with large infrastructure to the west, north, and east of the town boundaries. The growth of the oil and gas industry in the 20th century gave rise to modern housing developments, which now occupy the clifftops to the north and west of the old town centre. Much of the townscape has views across the waterway, with chimney stacks from the oil refinery breaking the skyline on the southern shore.

4.2 Hubberston Pill and Castle Pill are two tidal inlets that branch off Scotch Bay and are located on either side of the town centre. Corridors of green space and Public Rights of Way (PRoW) stretch along the coastline and follow these watercourses inland. Castle Pill, to the east of the town centre, is set within a meandering stream valley and connects with Deadman's Lake in the north. Hubberston Pill and its wooded valley divide the town centre from the modern residential development to the west. Dense woodland, some of it ancient, and cycling and walking paths along the watercourses provide opportunities for connectivity between the coast and surrounding countryside for both people and wildlife. The Pembrokeshire Coast Path passes along the coastline and through sections of the town, before being diverted up to Black Bridge at Castle Pill.

4.3 Beyond the green spaces along the water, larger public open spaces are located throughout the town, largely concentrated in residential areas. The open space network generally comprises playing fields and other recreational uses but is somewhat disconnected from the network of PRoW.

Figure 4.2: GI Opportunities within Milford Haven



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| MIL1 Transform the green space to the rear of Milford Haven Leisure Centre for biodiversity | MIL2 Expand the network of wildflower meadows on The Rath | MIL3 Enhance Gelliswick Bay greenspace and woodland |
| MIL4 Promote the enhanced management of Hubberston Pill Woods | MIL5 Improve the management of Castle Pill Wood | MIL6 Introduce a green ravine connecting Milford Haven train station to the waterfront |
| MIL7 Promote the greening of housing estates | MIL8 Create a Hubberston to Hakin nature corridor | MIL9 Strengthen the A4076 as a green corridor |
| MIL10 Enhance the greening of Mackerel Quay and Nelson Quay | MIL11 Improve the Water Gardens | MIL12 Introduce boundary planting at the playfield, Pill Lane |
| MIL13 Enhance the greening of Charles Street | MIL14 Enhance Gelliswick Woods | MIL15 Introduce street greening, rain gardens and permeable paving within Hakin |
| MIL16 Provide rain gardens and permeable paving at Havens Head Business Park | MIL17 Implement urban greening interventions, rain gardens and permeable paving at Castle Terrace and Great North Road | MIL18 Enhance the biodiversity and recreational value of Glebelands |
| MIL19 Promote community food growing in Milford Haven | | |

Kickstarter Projects

MIL2 – Expand the network of wildflower meadows on The Rath

4.4 The greenspace forming the frontage of The Rath was transformed into a wildflower meadow following the introduction of relaxed mowing regimes as part of 'No Mow May'. This intervention demonstrated what could be achieved through targeted maintenance.

4.5 As this area is characterised by a sloped embankment, much of the land is an unsuitable gradient for recreation and paved paths and benches are provided for people to walk and rest. Much of this area is therefore providing little function and offers the opportunity to be enhanced for biodiversity benefits.

4.6 Continuation of these mowing practices to the sloped edge of The Rath would provide much needed pollinator habitat in the centre of the town. To increase species diversity, native wildflower seed should be sown, or wildflower turf laid. Consideration should also be given to mechanisms to reduce topsoil fertility to increase the likelihood of wildflower establishment. The use of salt-tolerant wildflower species should be explored due to the proximity of the site to the coast.

4.7 Signage can play an important role in communicating to the public why the wildflower meadow is being established. This can help overcome perceptions of 'messiness' by conveying that the area is being prioritised for nature.

4.8 On the lower slopes, additional small-scale tree planting would be appropriate. However, views across Milford Haven should be retained.

Figure 4.3: MIL2



Benefits of the project

4.9 Benefits of the project, as depicted in Figure 4.4 below, include:

- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education & interaction with nature
- Reinforces a sense of place
- Improves health and wellbeing

Figure 4.4: Benefits



Delivery mechanisms

4.10 Annual cuts of wildflower meadow should be integrated into the work programme of the Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

4.11 Wildflower meadows and the community orchard should be delivered in accordance with the delivery section of the Pollinator Strategy.

4.12 There may be a requirement to reduce soil fertility to promote the successful establishment of wildflower meadows. This could be achieved by stripping away the top 5-10 cm of soil in the area where the wet meadow would be created. Autumn is the optimum time to sow wildflower seeds to provide the earliest display of wildflowers the following year. However, wildflower seeds can be planted throughout the year and would begin to bloom after approximately 60-80 days.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- Tree Wardens Pembrokeshire
- Milford Haven Town Council

- Pembrokeshire Nature Partnership
- Pembrokeshire Meadows Group

Outline cost

Low cost = <£250k

4.13 As described in the delivery section of the Pollinator Strategy, wildflower meadows can in fact save money from reduced mowing. Investment in a cut and collect machine may also aid overall savings on labour costs from gathering cuttings. Cost of wildflower seed is likely to be low, although this figure would be higher if plug plants or wildflower turf are utilised instead.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund

Timescale

Quick win = <1 year

4.14 Depending on soil fertility and if wildflowers are sown after Autumn, it may be the case that the seeds do not bloom until after their first winter season.

Potential constraints

4.15 Consideration should be given to how to gather the cuttings and remove them from the wildflower meadow to prevent enrichment of the soil. The most

efficient way to do so is with a cut and collect mower but this requires capital investment. Otherwise, arisings should first be gathered into rows which are then gathered into individual stacks. This can be labour intensive.

4.16 There can be a perception that wildflower meadows are untidy or messy, especially before and after flowers have bloomed. This could result in complaints from the public. Signage to communicate the benefits of growing wildflower meadows can help increase understanding and education regarding the importance of pollinators.

Maintenance and stewardship

4.17 A wildflower meadow requires a cut and lift at the end of the season. This is typically in September. The arisings should ideally be left for seven days to shed seed before removing. A second cut and lift may be required in early spring to remove winter growth. Care is required when mowing as small mammals, amphibians and reptiles may be hiding in the grass. Some birds nest in larger meadows, so mowing should not be undertaken until after the beginning of August. Dominant species such as nettle and dock should be managed through selective scything or hoeing.

4.18 Use of fertilisers, pesticides and insecticides should be avoided.

Monitoring for success

4.19 Monitoring should align with national schemes. The UK Pollinator Monitoring Scheme runs Flower-Insect Timed Counts (FIT Counts). This involves counting the insects visiting one of the 14 flower species target flowers within a 50cm by 50cm square patch for 10 minutes. Local residents and schools could be encouraged to participate in this as a citizen science initiative. Alternatively, plant 'indicator species' can be recorded within a 1km square to monitor species diversity.

Next steps

4.20 Review the delivery section of the Pollinator Strategy to determine the process and review case studies relating to the creation of wildflower meadows. Engage with the PCC StreetCare / Amenity Maintenance Team to communicate the proposed mowing regime.

Figure 4.5: Milford Haven

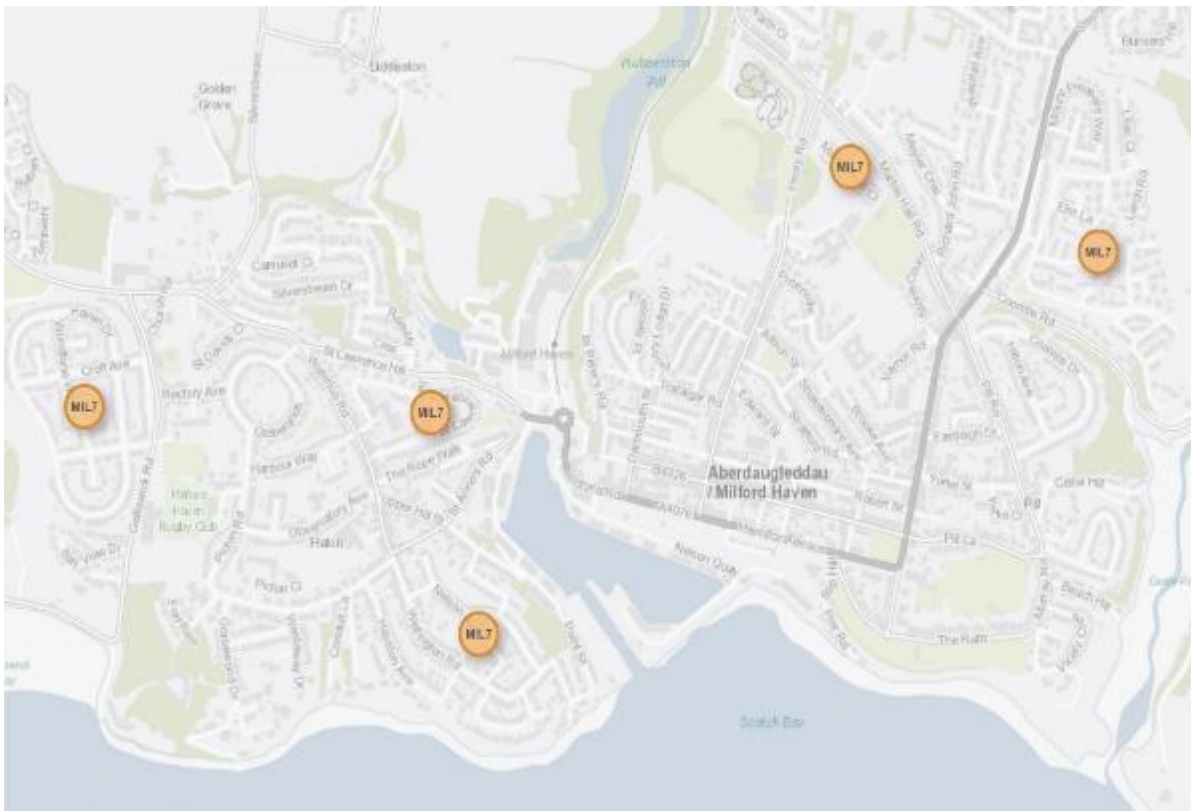


MIL7 – Promote the greening of housing estates

4.21 Several residential areas and housing estates within Milford Haven contain numerous small areas of publicly accessible greenspace. These areas

generally comprise short mown amenity grassland that offer limited biodiversity value. Working in conjunction with the local community and wider stakeholders, tree planting, small-scale food growing, wildflower meadows and other habitat interventions should be implemented to enhance the recreational and biodiversity value of these sites. This should involve the inclusion of log piles, insect hotels and bird / bat boxes within housing estates which at present host large swathes of close-mown amenity grassland, (e.g. Marble Hall, The Mount Estate, St Lawrence, around Nelson Avenue, and around Woodbine Way and Haven Drive).

Figure 4.6: MIL7 locations



Benefits of the project

4.22 Benefits of the project, as depicted in Figure 4.7 below, include:

- Reduces the risk of flooding

- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion
- Reinforces a sense of place
- Urban cooling
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 4.7: Benefits



Delivery mechanisms

4.23 A comprehensive programme of public engagement would be required across one or two small scale pilot sites to gauge community appetite for the project. This could involve a free community event to promote the concept and gather community support (i.e. a survey or similar). A funded project officer role would likely be needed to develop a programme of rolling projects with community engagement over several years. This could be based on a similar format as adopted by the Wildlife Trust of West Wales as part of their ‘Nextdoor Nature’ project <https://www.welshwildlife.org/about-us/what-we-do/wildlife-conservation/our-projects/nextdoor-nature>.

4.24 It would be beneficial if initial small scale tree planting was undertaken by Pembrokeshire County Council (PCC) to provide examples of what could be achieved and develop community interest in a long term project.

4.25 Individual sites identified for potential inclusion within the project would need to be assessed on an individual basis. All sites should be subject to a site survey to identify existing services, suitability of soil / ground conditions and visibility considerations (including views from residential dwellings etc.).

4.26 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Local community;
- PCC Highways and Transport Department;
- PCC StreetCare / Amenity Maintenance Team;
- Local businesses;
- Local schools; and
- Tree Wardens Pembrokeshire

Outline cost

Low cost = <£250k

4.27 Costs would be dependent on community uptake, engagement with proposals and capacity for tree planting. Costs for individual interventions would potentially be quite low, with the main cost likely arising from resourcing from the project officer to deliver community engagement. The scheme could also

include the provision of resources (such as trees) to residents to enhance private gardens for nature in the project areas.

Potential funding opportunities

- Pembrokeshire County Council (PCC);
- National Lottery Community Fund;
- Local Places for Nature Fund; and
- The Tree Council

Timescale

Medium-term = 1-5 years

4.28 The majority of community engagement, tree planting and habitat interventions should be undertaken over several planting seasons. The success of the scheme would be dependent on effective community engagement within several localities, delivered through a funded officer role.

4.29 Subsequent carbon sequestration of the trees and associated vegetation would be limited initially but would increase within the next decade as the trees reach maturity.

Potential constraints

4.30 Due to the urban context of potential project areas, underground / overhead services and utilities would present a notable constraint for tree planting. This type of intervention would therefore need to be adapted to suit the local constraints (i.e. focussing wildflower areas where there are notable service constraints that limit tree planting options). Any sites identified for small scale

food growing would need to be subject to more detailed soil testing to confirm suitability, including any potential issues associated with soil contamination.

4.31 Land searches would be required to determine land ownership of individual parcels of greenspace that are considered as part of the scheme.

4.32 Whilst tree planting would likely be small scale, advice should be sought as to whether any permissions or consents would be required. Engagement with the PCC Highways and Transport Department would likely be required to identify any highways constraints, including the maintenance of appropriate visibility splays.

Maintenance and stewardship

4.33 Due to the urban context of potential project areas, underground / overhead services and utilities would present a notable constraint for tree planting. This type of intervention would therefore need to be adapted to suit the local constraints (i.e. focussing wildflower areas where there are notable service constraints that limit tree planting options). Any sites identified for small scale food growing would need to be subject to more detailed soil testing to confirm suitability, including any potential issues associated with soil contamination.

4.34 Land searches would be required to determine land ownership of individual parcels of greenspace that are considered as part of the scheme.

4.35 Whilst tree planting would likely be small scale, advice should be sought as to whether any permissions or consents would be required. Engagement with the PCC Highways and Transport Department would likely be required to identify any highways constraints, including the maintenance of appropriate visibility splays.

Monitoring for success

4.36 Success would be monitored through the number of residents engaged, number of trees established and the range of habitat features created. The establishment of an independent community group would also indicate project success.

Next steps

4.37 Develop a more detailed project proposal to include proposed project governance and a programme. Scoping of funding options should be suitable for a project officer role, or alternatively through the identification of potential delivery partners.

4.38 Individual parcels of greenspace should be subject to an ecological survey to ascertain sites best suited to the various interventions. Plans for an initial community engagement event to gauge community / resident interest within the project areas should also be developed. Areas for a pilot tree planting project following initial community engagement should also be identified.

4.39 The delivery section of the Urban Tree Planting Strategy should be reviewed to determine the process for planting trees within soft landscapes and understand the key components for successful tree establishment.

MIL16 – Introduce street greening, rain gardens and permeable paving within Hakin

4.40 Hakin is located to the west of Milford Haven town centre, characterised by predominantly residential properties. The south and south eastern areas of Hakin have suffered from multiple Combined Storm Overflows (CSOs) incidents

(where foul effluent is released into rivers due to the capacity of the infrastructure being exceeded).

4.41 The area is typified by large grassed verges which offer the opportunity for tree planting within the soft estate. Introduction of permeable paving, rain gardens and tree planting in this area would aid the slowing of surface water run-off, helping to reduce potential surface water flood risk and reduce the fluvial input into the sewer system at times of high rainfall. This is in addition to the positive contribution of these interventions to townscape character.

4.42 Working with the local community, locations for street tree planting should be identified. Harbour Way offers the potential for planting of trees, potentially in combination with linear rain gardens and community parklets. The play area at Glebelands Road is currently devoid of tree cover and would also form a potential target for intervention.

4.43 By working with local residents to identify locations and preferred species selection, community ownership of the trees would be promoted. Furthermore, consideration should be given to the implementation of a tree replenishment programme to address the diminished tree stock in the town. Canopy cover within Milford Haven is currently just under 10%.

Figure 4.8: MIL16 project



Benefits of the project

4.44 Benefits of the project, as depicted in Figure 4.9 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhances visitor experience
- Spaces for wildlife & ecological resilience
- Enhances air quality & noise regulation
- Reinforces a sense of place
- Urban cooling
- Improves health & wellbeing
- Carbon sequestration & climate change.

Figure 4.9: Benefits



Delivery of nature-based solutions and ecosystem services

4.45 The implementation of rain gardens, tree planting and permeable paving within these areas would improve the character of the townscape and introduce a sustainable approach of dealing with rainwater run-off.

4.46 SuDS interventions mimic drainage in nature where precipitation is absorbed into the ground, slowed by vegetation. The quantity and quality of water that ends up in local watercourses is therefore improved, helping to alleviate flooding and reduce CSOs. Sustainable management of water in urban areas also ensures towns are more resilient to the pressures of climate change and population growth.

Delivery mechanisms

4.47 An initial study should be undertaken to identify where the topography, street scene and storm sewer network conditions combine to result in the most effective and deliverable interventions. The local community should also have the ability to put forward requests for rain garden and tree planting. If the location is appropriate and funding available, the tree should be added to the annual planting programme.

4.48 An annual planting programme should be established to successfully plan, deliver and manage the new tree planting, rain gardens and permeable paving areas. Sufficient planning is required prior to the bare-root planting season (October-March at the latest) to ensure ground checks / soil testing is completed.

4.49 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

4.50 New tree pits, rain gardens and other features should be positioned and designed such that they are able to accept overland flow routes, thus rediverting flows that would otherwise enter storm gullies and the wider sewer network.

Potential partners

- Local community
- Pembrokeshire County Council (PCC) Highways and Transport Department
- PCC StreetCare / Amenity Maintenance Team
- Local businesses
- Tree Wardens Pembrokeshire
- Dwr Cymru Welsh Water
- South Wales Trunk Road Agent (SWTRA)

Outline cost

Low cost = <£250k

4.51 Price is scalable depending on the number of trees planted / rain gardens created / permeable paving areas installed. However, a rough estimate of

~£10,000 to appropriately establish a tree within hard landscaping should be applied.

4.52 Costs would comprise some limited specialist advice including utility searches, stakeholder consultation and planting / maintenance costs.

4.53 More technically challenging / construction orientated solutions such as permeable paving and the interception and redirection of existing surface water sewers would be more expensive (Medium Cost £250k – £1m).

Potential funding opportunities

- Developer contributions
- PCC
- National Lottery Community Fund
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council
- Nature Networks Fund
- Transforming Town Fund
- NRW grants
- Dwr Cymru Welsh Water

Timescale

Quick win = <1 year

4.54 Tree planting and rain garden creation should be delivered at a few key locations in the next planting season.

Medium-term = <1-5 years

4.55 The majority of tree planting, rain garden creation and permeable paving aspects should be delivered across the next five planting seasons to allow for sufficient planning and engagement. Permeable paving should be installed where opportunities for tree planting and rain garden installation are limited. Opportunities to intercept and redirect surface water flows in sewers is also anticipated to require a medium term timeline of 1 – 5 years.

Potential constraints

4.56 There are a considerable number of potential stakeholders to engage with for this project, with various landholders and the engagement process critical to the success of the scheme. PCC Highways and Transport Department and the SWTRA must be involved in the project.

4.57 The majority of the surfacing within the potential project area is characterised by hard landscape. The cost of excavating tree pits within hard landscapes is more expensive than within soft landscapes. Therefore, new tree planting must achieve the right balance between cost, space and desired function / design. In some circumstances, fewer trees with a larger rooting volume may be appropriate.

4.58 Within the urban environment the potential for a variety of services and utilities to be located within potential planting areas and avoidance of these must be considered when accounting for the installation of tree planting. Rain gardens typically require shallower depths of installations and would therefore have a lower probability of conflict with services. There may be the potential for substituting tree planting in favour of rain gardens in areas identified to have a high probability of services.

4.59 New tree planting must also maintain key vistas. Therefore, all planting proposals should be prepared in conjunction with PCC.

Maintenance and stewardship

4.60 Establish a resident or commercial partner working group alongside PCC Street Care and Highways Department to take ownership of the new tree planting. A training day could provide the community with the tools and knowledge to successfully maintain new trees until establishment, including watering and checking tree stakes.

4.61 Watering and establishment care would be needed for the 60 month establishment phase to ensure trees are able to become independent in the landscape.

4.62 Permeable paving areas would need to be either adopted by PCC or by the relevant landowner.

Monitoring for success

4.63 Subject to the availability of funding, monitoring of the success of the project should be in conjunction with data from Dwr Cymru Welsh Water in terms of sewer capacity and reduction in CSO events.

4.64 Utilise the resident working group to monitor the successful establishment of new street trees and gardens. Establish a communication channel for reporting of any issues or failures.

Next steps

4.65 Undertake a feasibility survey of the Hakin area, to determine where new trees, tree pits and rain gardens might be best positioned to accept flow from areas of hardstanding and therefore help divert water away from the storm sewer network.

4.66 Immediately identify landholders and commercial partners and engage with potential stakeholders, including SWTRA and the appropriate departments of PCC.

4.67 Review the delivery section of the Urban Tree Planting Strategy to determine the process for planting trees within soft landscapes and understand the key components for successful tree establishment.

4.68 Engage residents and community groups to identify locations for tree planting and selecting species, using the species selection guide within the Urban Tree Planting Strategy.

Project List

MIL1 - Transform the green space to the rear of Milford Haven Leisure Centre for biodiversity

4.69 This land currently serves little function for people or wildlife. Opportunities should therefore be sought to introduce wildflower meadows as well as a

butterfly bank on the central ridge. Consideration should also be given to the adjacent area of woodland to encourage ground flora, with Japanese knotweed removal required on the northern edge. Working with Milford Haven Youth Centre and the Milford Haven Leisure Centre, opportunities to deliver sensitive access to nature through trim trails / fitness trails should also be explored to complement the existing shared-user path which crosses the area.

MIL2 - Expand the network of wildflower meadows on The Rath

4.70 Refer to Kickstarter Projects.

MIL3 - Enhance Gelliswick Bay greenspace and woodland

4.71 Working with local schools and community groups to promote local buy-in, promote the biodiversity value of the greenspace in front of Gelliswick Road and Gelliswick Beach by sowing with salt-tolerant wildflower meadow seed. The adjacent woodland should also be opened up to allow light to reach the understorey and encourage the establishment of a diverse ground flora.

MIL4 - Promote the enhanced management of Hubberston Pill Woods

4.72 Create a woodland management plan to help transform Hubberston Pill Woods into a state of positive and active management. Improve the range of habitats and shelter for wildlife using thinning to allow ground flora to thrive. Promote the use of dead wood as a vital habitat for pollinator nesting and larval development. Consideration should also be given to improving wayfinding to

connect to Priory Inn and implementing a volunteer scheme to tackle the spread of Himalayan balsam.

MIL5 - Improve the management of Castle Pill Wood

4.73 Create a management plan which promotes positive management practices, including coppicing and the implementation of a planting strategy to reduce invasive species and mitigate the effects of ash dieback (*Hymenoscyphus fraxineus*). Selective thinning should also be considered to provide a greater diversity of ground flora. The opportunity exists to enhance access and wayfinding, making connections with the Wales Coast Path and local communities, as well as interpretation at structures such as Dead Man's Lake Dam. Wider proposals to deliver a footpath connecting Coombs Road to Vicary Crescent should also be supported.

MIL6 - Introduce a green ravine connecting Milford Haven train station to the waterfront

4.74 Landscape architects have been engaged and design proposals progressed for the creation of a green ravine at this location. The link would run to the rear of commercial shops and cafes off Victoria Road. The proposals provide the opportunity for improved active travel corridors, alongside enhanced habitat provision. The opportunity also exists to review landscape management interventions and refurbish areas of ornamental planting along this route.

MIL7 - Promote the greening of housing estates

MIL8 - Create a Hubberston to Hakin nature corridor

4.75 Seek to connect areas of woodland to the north of Hubberston towards Milford Haven estuary using existing greenspaces and corridors. The potential to establish additional tree planting and wildflower meadows along Gelliswick Road, including the route of the existing shared-user path, should also be explored. Amenity greenspace between Dale Road and Rectory Avenue could also accommodate several large parkland trees, orchard trees and boundary planting. The boundaries of greenspaces at Hakin United AFC and Gelliswick Primary School should be reviewed for habitat improvements to provide a direct link to woodland at Fort Hubberston.

MIL9 - Strengthen the A4076 as a green corridor

4.76 The A4076 is a key gateway and entry point for Milford Haven and hosts large stretches of amenity green space and close mown grass verges. Wildflower verges and additional planting, particularly along the Steynton Road and Hamilton Terrace stretches of the A4076 would improve user experience as well as provide direct green corridors into the heart of Milford Haven. Where space is more limited, raised planters with native pollinator plants should be implemented. Proposals should be developed in conjunction with plans to deliver a shared-user path between Johnston and Steynton (following the corridor of the A4076).

MIL10 - Enhance the greening of Mackerel Quay and Nelson Quay

4.77 Mackerel Quay at Milford Haven's waterside currently serves as a car park with large expanses of hard surfacing. Raised planters incorporated within seating areas, restaurant spill out areas, cycle parking and electric bicycle charging stations should be included to provide a more welcoming and pleasant experience for visitors to the harbour, whilst taking advantage of expansive views across Milford Haven. Tree planting should also be extended along Nelson Quay to delineate a route between the station and the waterfront.

MIL11 - Improve the Water Gardens

4.78 Introduce further improvements to the landscape management of the Water Gardens, including the future repair of the water basins. The reintroduction of water features should be considered as a mechanism to improve the site's visitor appeal whilst providing biodiversity benefits.

MIL12 - Introduce boundary planting at the playfield, Pill Lane

4.79 Improve the character of the site and the adjacent street scene through the introduction of tree planting along the boundary fences and delivery of the Pill Lane shared-user path. Specimen tree planting should be considered for the delineation and definition of entrances and gateway features.

MIL13 - Enhance the greening of Charles Street

4.80 Charles Street forms a semi-pedestrianised commercial street with parallel parking bays along both sides with some existing established street trees. The reclaiming of some parking spaces for urban greening features; including street trees, parklets, cycle parking, electric bike hire, pollinator-friendly raised planters and seating would create a more attractive and well-used public realm, whilst also enhancing the townscape character of this key shopping area. Longer term aspirations should include the installation of linear rain gardens to enhance water alleviation.

MIL14 - Enhance Gelliswick Woods

4.81 Proposals should seek to enhance access to the woods above Gelliswick and create a circular route utilising the existing PRoW. Wayfinding provision from Hubberston Drive, Gelliswick Beach and Hubberston & Hakin Play Area should also be improved. The creation of a management plan for the woodland to restore the site into a state of positive management would help to create a more diverse mosaic of habitats; including selective thinning to allow ground flora to thrive as well as the establishment of riparian habitats within the valley bottom.

MIL15 - Introduce street greening, rain gardens and permeable paving within Hakin

4.82 Refer to Kickstarter Projects.

MIL16 - Provide rain gardens and permeable paving at Havens Head Business Park

4.83 Havens Head has previously been impacted by floods, notably in 2018, with the surrounding vicinity also impacted by a number of combined sewer overflow incidents. The opportunity exists to retrofit Sustainable Drainage Systems (SuDS) interventions within large areas of hardstanding in order to divert storm water from combined sewers and slow surface water run-off. These measures would reduce pressure on infrastructure and help to reduce fluvial influence in times of flooding.

MIL17 - Implement urban greening interventions, rain gardens and permeable paving at Castle Terrace and Great North Road

4.84 The area of Castle Terrace towards Coombs Road is recorded as at risk from surface water flooding. A Combined Sewer Overflow (CSO) incident has also been recorded on Great North Road. Castle Terrace, Coombs Road and Steynton Road are typified by grass verges which offer the potential for the creation of various SuDS interventions and tree planting. The use of permeable paving and rain gardens should also be explored on gradients; including Lidl car park on Great North Road. The delivery of these interventions offers the opportunity to link with wider active travel initiatives, including a proposed shared-user path along Coombs Road to Black Bridge.

MIL18 - Enhance the biodiversity and recreational value of Glebelands

4.85 Explore opportunities to enhance the quality and value of recreational provision at The Dome, Glebelands. Overlooked by residential properties, the

site provides informal surveillance with the potential for urban greening interventions, including tree planting, to soften the urban setting. Consideration should also be given to biodiversity enhancements within existing areas of close mown amenity grass.

MIL19 - Promote community food growing in Milford Haven

4.86 The opportunity exists to work with Pembrokeshire County Council (PCC) to select an appropriate site to increase allotment provision within the town. The intervention should encourage plot owners to reduce the use of pesticides and herbicides, instead choosing to work the land organically. Additional tree and orchard planting opportunities should also be explored. Where possible, planting margins should be left uncut, sheds fitted with living roofs and bird feeders added to attract wildlife.

Chapter 5

Narberth

Figure 5.1: Narberth



A Portrait of Narberth's Green Infrastructure

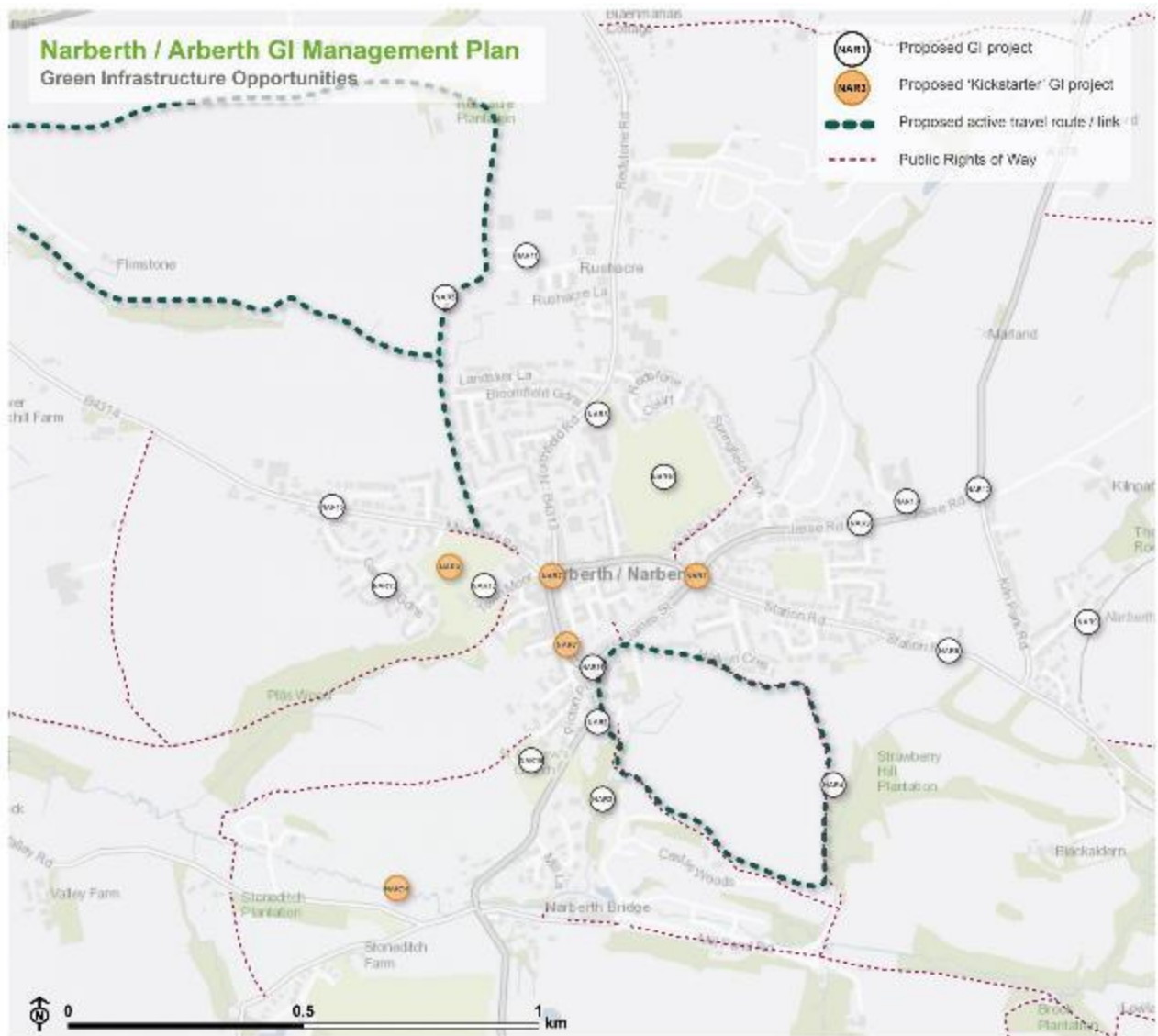
5.1 Narberth is a small market town of just over 2,000 residents located in the south east of Pembrokeshire. With origins dating back to the Middle Ages, the

town centre is designated as a Conservation Area and contains numerous listed buildings located along the High Street. The 13th century Narbeth Castle, designated as a Scheduled Monument, is situated just south of the town centre within a wooded public space. The south-eastern extent of the Cleddau Rivers Special Area of Conservation (SAC) originates to the south of the town centre at Narberth Bridge. This small meandering watercourse passes through pastoral fields and wooded river valleys before feeding into the Eastern Cleddau river at Canaston Bridge. This in turn merges with the Pembrokeshire Marine SAC at Blackpool Bridge.

5.2 Large open spaces sit towards the edge of the town centre and consist primarily of open recreational fields with few pedestrian links. Public footpaths instead extend south of the town centre, joining up with the wooded areas along the Eastern Cleddau. Links into the wider landscape within the north of the town are distinctly lacking. Although no National Cycle Network (NCN) routes connect directly with the town, plans for an off-road route between Narberth and Haverfordwest will connect the town with NCN route 4. An initial stretch which connects the west of Narberth at Town Moor with Canaston Bridge has been recently opened.

5.3 Larger woodland blocks are concentrated to the south of the town, at the edges of open spaces and connecting to linear woodland belts along the river corridor. These woodland areas provide opportunities to further strengthen the Public Right of Way (PRoW) network on the outskirts of the town.

Figure 5.2: GI Opportunities within Narberth



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|---|---|---|
| NAR1 Improve connections and interpretation at Narberth Castle | NAR2 Deliver woodland habitats at Narberth Castle | NAR3 Enhance the biodiversity value of Towns Moor |
| NAR4 Introduce a circular walk at Narberth Castle | NAR5 Provide a circular walk to the north west of Narberth | NAR6 Establish a community orchard |
| NAR7 Promote the greening of Narberth town centre | NAR8 Enhance the setting of Bloomfield Community Centre | NAR9 Create links with Narberth Station |
| NAR10 Enhance the biodiversity value of the rugby ground perimeter | NAR11 Promote the greening of Ruchace Enterprise Park | NAR12 Create a green gateway at the A478 and Kill Park Road junction |
| NAR13 Deliver pollinator-friendly approaches at Narberth C.P. School | NAR14 Introduce riparian tree planting and wetlands at Narberth Bridge | NAR15 Promote tree planting at Cox Hill and Garfield Gardens |
| NAR16 Replace the missing tree adjacent to Narberth War Memorial | NAR17 Introduce rain gardens, street trees and permeable paving in Towns Moor car park | NAR18 Deliver enhancements to St. Andrews Churchyard |

Kickstarter Projects

NAR3 – Enhance the biodiversity value of Towns Moor

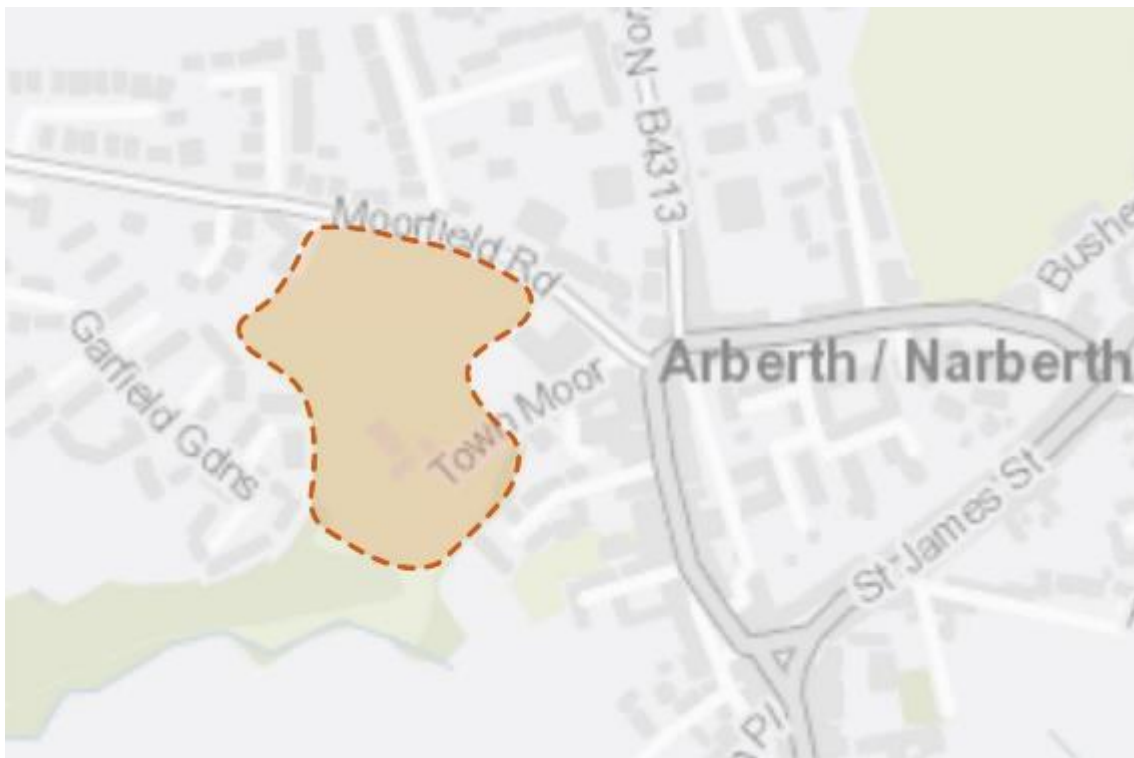
5.4 Towns Moor is a registered village green and well-used recreational space, providing play equipment, active travel routes and publicly accessible greenspace.

5.5 Steeper embankments to the south, which are of little recreational value, are currently characterised by long grass. However, the species diversity of the sward is limited. This could be improved by sowing wildflower seed or plug planting with native nectar rich plants to support pollinators, whilst continuing with a wildflower meadow mowing regime. Native flowering plants, such as Tenby daffodil, could also be planted around the base of large mature trees to further increase the pollinator resource. Consideration should be given to the introduction of a relaxed cutting regime within the perimeter of the car park as well as the use of deadwood, occasional mown paths and glades for informal seating and play. The provision of a range of habitats for food and shelter should be focussed to the south of the site due to reduced recreational pressure. Biodiverse rain gardens could also be installed in the waterlogged parts of the village green to provide additional habitats and contribute to flood management.

5.6 Additional tree planting using varied typologies; including avenue planting, specimen trees, fruit and nut trees, hedgerows, edible hedges and shrubs should be implemented, for example along active travel routes. Hedgerows and shrubs should also be planted along the informal areas adjacent to residential properties to the north west of Towns Moor. This would define the boundary of Towns Moor, enhancing its appearance and contribute to habitat connectivity. Connections to the belt of woodland to the south west would also be improved, strengthening its role as a foraging and commuting corridor for bats.

5.7 These interventions would complement proposals to upgrade existing footways to shared-user paths within the Towns Moor area.

Figure 5.3: NAR3



Benefits of the project

5.8 Benefits of the project, as depicted in Figure 5.4 below, include:

- Reduces the risk of flooding
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Reinforces a sense of place
- Urban cooling

- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 5.4: Benefits



Delivery mechanisms

5.9 Wildflower meadows, community orchards and species rich hedgerows should be delivered in accordance with the delivery section of the Pollinator Strategy.

5.10 Trees should be planted in accordance with the delivery section of the Urban Tree Planting Strategy.

5.11 Annual cuts of wildflower meadow should be integrated into the work programme of the Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- Pembrokeshire Nature Partnership
- Arberth gwyllt / Wild Narberth

Outline cost

Low cost = <£250k

5.12 Wildflower seeds are relatively inexpensive and savings would be made due to reduced mowing operations. The number of trees planted with have an influence on the overall cost.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund.

Timescale

Medium-term = 1-5 years

5.13 The various interventions may be staggered over planting seasons to align with available capacity and resource. Wildflowers would be quick to establish if soil fertility is low.

Potential constraints

5.14 The design of the enhancements would need to balance the need for nature recovery and provision of wildlife habitat with the requirement for access and enjoyment of the site. This should be achieved through the sensitive design of the space to provide distinct routes for active access, opportunities to explore nature as well as areas for biodiversity.

5.15 The extent of the wildflower planting would have to ensure that it does not impede on community events within the existing greenspace.

5.16 Wildflower meadow can occasionally draw complaints from members of the public who view the areas as messy or unmanaged. Signage and interpretation can help communicate the deliberate intention of the meadow and raise awareness of pollinators.

5.17 Consideration needs to be given to how to gather the cuttings and remove them from the meadow area to prevent enrichment of the soil. The most efficient way to do so is with a cut and collect mower but this requires capital investment.

5.18 Trees along active travel routes would need to be regularly checked to ensure they don't impede access or cause any health and safety concerns.

Maintenance and stewardship

5.19 A wildflower meadow requires a cut and lift at the end of the season. This is typically in September. The arisings should ideally be left for seven days to shed seed before removing. A second cut and lift may be required in early spring to remove winter growth.

5.20 Watering and establishment care would be required as part of a 60 month maintenance period to ensure trees are able to become independent in the landscape.

5.21 Tree guards would need to be checked and removed when there is no longer a risk of damage.

Monitoring for success

5.22 The survival rate of new planting and wildflower meadow establishment should be monitored for indicators of success. Once all biodiversity enhancements have been implemented, an annual community BioBlitz could be organised to record the variety of life at the site.

Next steps

5.23 Review the delivery section of the Urban Tree Planting Strategies to determine the process for planting trees and to understand the key components for successful tree establishment.

5.24 Review the delivery section of the Pollinator Strategy to determine the process and review case studies relating to the creation of wildflower meadows.

5.25 Establish willingness of Wild Narberth or another community group to be involved in the management and maintenance of new tree planting.

Figure 5.5: Narberth



NAR7- Promote the greening of Narberth town centre

5.26 Narberth town centre is characterised by an attractive mix of shops, buildings and heritage assets, including the distinctive Narberth Town Hall and the Narberth War Memorial. At present, the High Street is dominated by vehicles, with on street parking regularly provided on both sides of the one-way street. There is the opportunity to reclaim some of this space from vehicles and provide a safer, more attractive pedestrian environment.

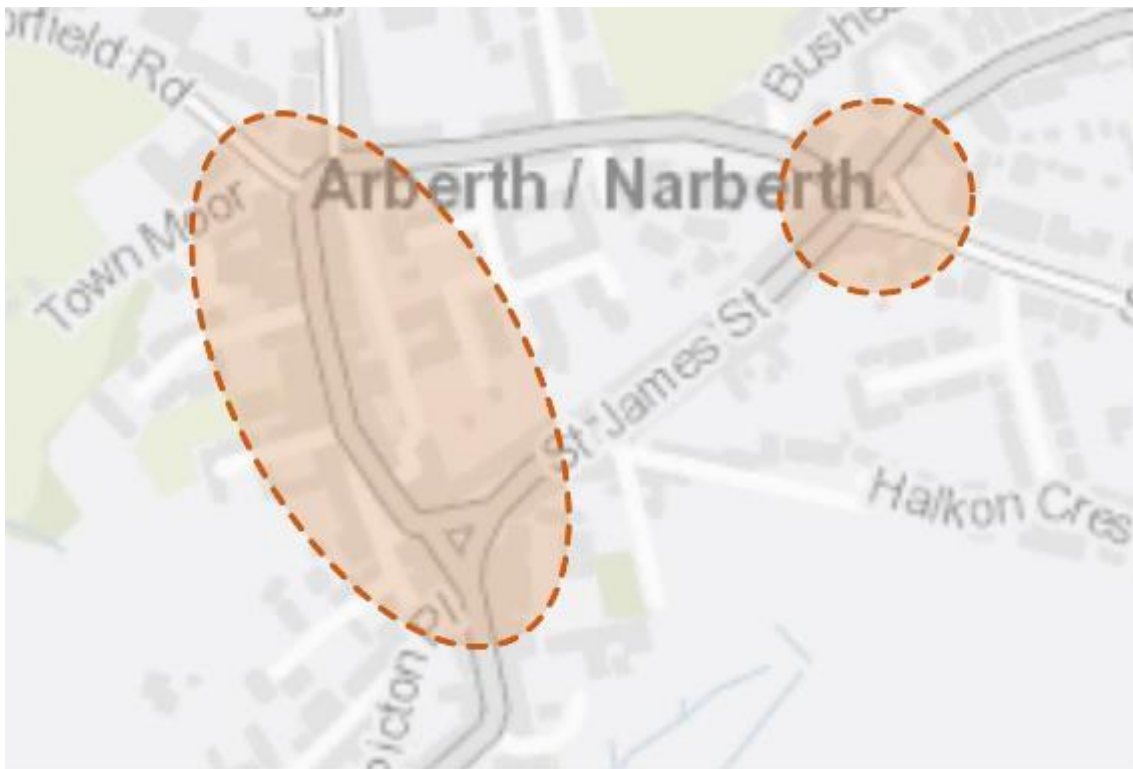
5.27 Existing raised planters should be re-purposed or upgraded to create larger and more impactful areas of pollinator-friendly planting with incorporated

spaces for seating and cycle parking. Where spaces and underground services are not a constraint, the removal of some hard landscape should be undertaken to create larger areas of planting and rain gardens. The removal of occasional parking spaces could be used to accommodate additional street tree planting or parklets. This should be focussed on one side of the street to create a larger space for pedestrians and spill out space for businesses. Where space and underground services permit, the introduction of additional street trees should be explored.

5.28 These opportunities also apply to the junction of Station Road and the A478 where there is a large amount of hard landscaping with existing planters. Market Street and around the War Memorial also have the potential to reclaim space from car parking and integrate areas of greenspace within existing public realm. The rolling out of green bus stops across Narberth through the use of green roofs, climbers and raised planters should also be explored.

5.29 The High Street should be investigated as a possible location for a shared-user path. This could link with the recently delivered cycle link towards Canaston Woods and Haverfordwest.

Figure 5.6: NAR7



Benefits of the project

5.30 Benefits of the project, as depicted in Figure 5.7 below, include:

- Reduces the risk of flooding
- Provides active travel opportunities
- Enhances water quality
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion

- Reinforces a sense of place
- Urban cooling
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 5.7: Benefits



Delivery mechanisms

5.31 The delivery of interventions such as tree planting should be achieved in collaboration with local residents and businesses. By allowing residents to have a say in what species they would like to see outside their homes / businesses, and where they would like them planted, it would encourage greater stewardship of the specimens through and beyond the establishment period. The design of tree pits, the depth and soil used and the on-going watering and maintenance is vital in ensuring successful establishment.

5.32 Where possible, trees and planting material should be sourced locally.

5.33 Planting practices should follow the delivery guidance set out within the Urban Tree Planting Strategy and the Pollinator Strategy.

Potential partners

- Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team;
- Local businesses;
- Local community;
- Tree wardens Pembrokeshire; and
- Narberth Town Council

Outline cost

Medium cost = <£250k - £1 million

5.34 This project is very scalable and improvements could be made for <£250k. However, it is recommended that the High Street, Market Street and the junction with Station Road are reviewed and designed as a whole to help create a more functional and cohesive town centre.

High cost = >£1 million

5.35 Should a shared user path be implemented along the High Street, then this would increase costs.

Potential funding opportunities

- Local Places for Nature Fund
- Business sponsorships
- Pembrokeshire County Council
- Shared Prosperity Fund

Timescale

Medium-term = 1-5 years

5.36 This project is scalable, and interventions could be implemented on the ground relatively quickly. However, if a cohesive approach is taken which looks at Narberth town centre as a whole, the project could take a number of years to deliver.

Potential constraints

5.37 Businesses may object to the proposals if they believe footfall would reduce due to limited parking. The design process would therefore need to be collaborative, with precedent examples provided of where greening interventions have resulted in positive impacts in other village / town centres. Similar engagement would be needed with accessibility groups, and it should be made clear from the outset that blue badge parking would remain.

5.38 Underground services and utilities could limit the amount of 'in the ground' interventions, including rain gardens and trees in hard landscapes.

5.39 Establishing vegetation, particularly trees, within hard landscapes is much more difficult than in soft landscapes and continued maintenance during the establishment period (60 months) would be needed to ensure the trees can be independent in the landscape. The Urban Tree Strategy delivery section should be used to guide appropriate planting and maintenance.

Maintenance and stewardship

5.40 The PCC StreetCare / Amenity Maintenance Team should be ultimately responsible for the establishment of trees and any planting material. However,

collaboration and engagement with the community and businesses from the outset of the project would help to deliver greater long-term stewardship of the scheme. Businesses should be able to sponsor trees, planters or parklets and they could also contribute towards their ongoing maintenance. This could include watering during dry periods or reporting any failures to PCC.

5.41 Review the Urban Tree Strategy and Pollinator Strategy 'delivery' sections.

Monitoring for success

5.42 Understanding the impact of this greening project on footfall and business prosperity would be a useful tool for encouraging investment elsewhere and to determine whether schemes like this should be replicated. Regular surveys with local businesses, traffic surveys and pedestrian counts should be used to understand how the use of the town centre changes before and after the implementation of the project.

Next steps

5.43 Consult with the PCC StreetCare / Amenity Maintenance Team.

5.44 Consult with local businesses, particularly where car parking spaces would be reduced, to understand the appetite for the scheme and to ensure any concerns are addressed prior to the design process.

5.45 Consult with accessibility groups.

5.46 Instruct a landscape architect to develop conceptual designs for the town centre.

Figure 5.8: Narbeth

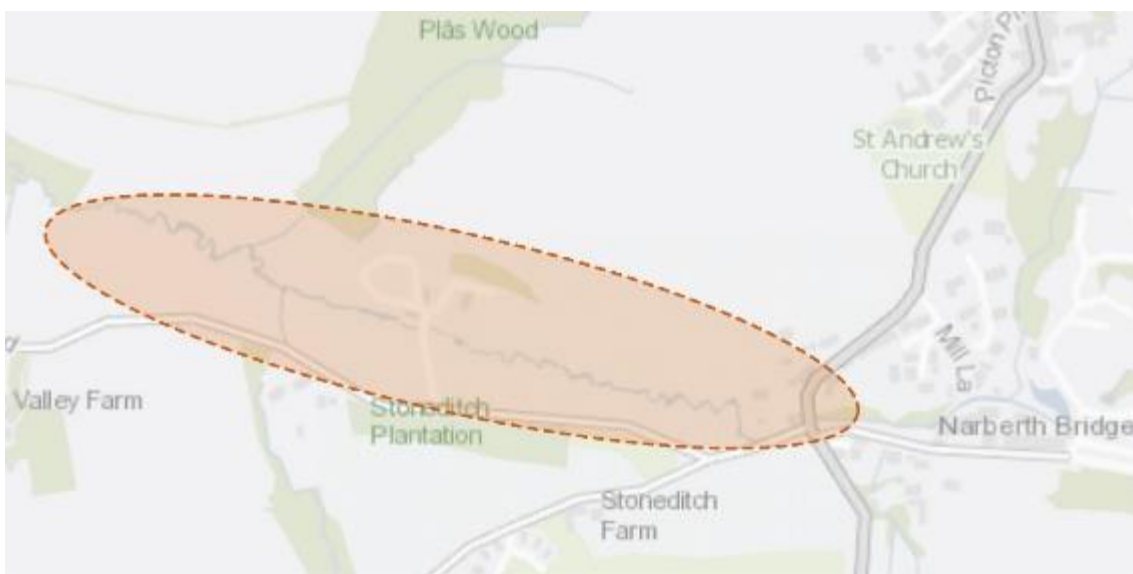


NAR14 – Introduce riparian tree planting and wetlands at Narberth Bridge

5.47 An area of grazing land between Narberth Bridge and Narberth West Wastewater Treatment Works offers the opportunity to host additional riparian tree planting and wetland scrapes. This intervention would provide enhanced habitat connectivity within the wider Cleddau Rivers Special Area of Conservation (SAC). Additional benefits of the project would include the storage of floodwater and the provision of a buffer for sewage outfall in periods of high rainfall. The proposal would also result in improved water quality, reduced flood risk as well as decreased risk of siltation of adjacent waterbodies.

5.48 The creation of wetland habitat would aid nutrient stripping of the outfall, helping to alleviate the discharge of the nutrient load and reducing the impact on the wider Cleddau Rivers SAC. The Cleddau River itself is the subject of an ongoing Natural Resources Wales (NRW) led 'Four Rivers for LIFE' project to protect, enhance and help restore the watercourse. Proposed wetland and riparian tree planting, therefore, aligns strongly with the aims of the project.

Figure 5.9: NAR14



Benefits of the project

5.49 Benefits of the project, as depicted in Figure 5.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Reinforces a sense of place
- Carbon sequestration & climate mitigation

Figure 5.10: Benefits



Delivery of nature-based solutions and ecosystem services

5.50 Land use management for the previous 90 years has involved increased drainage of the land, in a drive to maximise efficiency of farmland. This has led to the reduction in the diversity of habitats, and the loss of wetlands, wet-grassland and associated wet terrestrial habitats. It has also exacerbated flood risk, as it increases the speed and volume of water flow down catchments, reducing the buffering effect of the landscape during heavy and prolonged rainfall events. Increased drainage of wet soils also has a detrimental effect on the ability of that soil to sequester carbon.

5.51 Through the use of techniques such as riparian buffer strips, which reduces bank erosion and poaching by livestock, planting of shelter belts and field margins, the ability of the landscape to absorb and buffer rainfall could be significantly increased. This would have a beneficial impact on flood risk, water quality and carbon sequestration. Re-wetting of wetland soils would also increase their capacity to absorb and lock-in carbon.

5.52 The creation of wetlands could be used to limit the quantity of phosphorus and nitrogen entering the river, by absorbing and sequestering nutrients as water passes through the system, essentially filtering the water. The run-off from sewage treatment facilities is typically rich in nutrients and wetlands can be

used to help alleviate this issue, as well as contribute to other ecosystem services

Delivery mechanisms

5.53 An initial site survey and scoping should be conducted by trained citizen scientists, Pembrokeshire County Council (PCC) staff or trained consultants. It would be necessary to engage with landowners and land occupiers / graziers in order to present this opportunity and discuss its impacts on current land-use. In addition, discussion with Dwr Cymru Welsh Water (as operator of the sewage treatment plant), West Wales Rivers Trust and NRW would also be beneficial. This discussion with potential partners would shape the nature of the project, with the potential balance between wetland creation and tree planting to be determined by costs, stakeholder preferences and potential benefits.

5.54 We envisage the proposed physical interventions and amendments to land management could be delivered by the landowners themselves, or by external agricultural contractors.

5.55 The potential exists for the project to be used to create nutrient trading credits as a mechanism to wholly or partially fund the intervention, with a pilot scheme run by EEP-Ecobank for nutrient credits operating within the Milford Haven catchment (although the status of this project is currently unclear).

Potential partners

- Wildlife Trust of South and West Wales;
- NRW;
- West Wales Rivers Trust;
- Landholders; and
- Dwr Cymru Welsh Water

Outline cost

Low cost = <£250k

5.56 Costs would comprise some limited specialist advice, land agent fees, fencing, tree planting costs and potential machinery for the creation of wetland scrapes. If a more engineered wetland solution to help improve sewage effluent is preferred following consultation, the costs would increase.

Potential funding opportunities

- Emerging Welsh Government Sustainable Farming Scheme
- National Forest for Wales – The Woodland Investment Grant (National Lottery Heritage Fund – Round 1)
- Dwr Cymru Welsh Water
- NRW
- Nutrient credits in partnership with EEP Ecobank, Pembrokeshire Coastal Forum or potentially PCC

Timescale

Quick win (<1 year)

5.57 Riparian tree planting, shelterbelt and field margin creation could be delivered at a few key locations in the next planting season, with landscape maintenance required across the 60 month establishment phase. A key unknown for the project would be the time taken to gain landowner / occupier / grazier agreements / consents and source funding.

Medium-term (1-5 years)

5.58 The majority of tree planting should be delivered across the next five planting seasons to allow for sufficient planning and engagement.

Potential constraints

5.59 A key constraint for the project would be landowner / occupier / grazier agreements, as there may be a perceived risk to farm viability associated with some loss of land to riparian margins / shelter belts / field margin planting etc. These concerns should be countered with the availability of agricultural payments for environmental goods and services, and hence the delayed launch of the Welsh Government's Sustainable Farming Scheme is a potential constraint in this regard.

5.60 An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Maintenance and stewardship

5.61 Maintenance of the softworks and wetland would be required as part of the 60 month establishment phase, including the replacement of failed trees.

5.62 If an engineered wetland is introduced as part of the project, this would entail increased maintenance requirements, which would be the responsibility of Dwr Cymru Welsh Water.

Monitoring for success

5.63 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science, with suitable support. Shelterbelt success is often dependent on initial design but also subsequent care and management using silvicultural techniques to maintain the shelterbelt beyond the life expectancy of the original tree planting.

Next steps

5.64 Engage with landowners / occupiers / graziers and enter into agreements to deliver interventions on their land. Consultation with NRW should also be undertaken to investigate whether the project benefits align with the Four Rivers for LIFE project and potential funding opportunities. The potential for nutrient credits to offset project costs should also be explored.

Project Long List

NAR1 - Improve connections and interpretation at Narberth Castle

5.65 The current entrance to Narberth Castle is concealed, indistinct and used predominantly for vehicle parking. The opportunity exists to improve the gateway to the site through improved signage and controlled access points. Enhancements to wayfinding from Market Street would increase awareness of the site and should encompass signage on the widened pavement at the junction of Market Street and Castle Terrace. Improved interpretation boards within the grounds of Narberth Castle should also be considered.

NAR2 - Deliver woodland habitats at Narberth Castle

5.66 Narberth Castle's boundary should be enhanced through the provision of access to the adjacent Pembrokeshire County Council (PCC) owned woodland to the east of the site. Enhanced woodland management should provide space for a diverse range of habitats, as well as areas for shaded seating, natural play and recreation. Links with the adjacent Brookside and Castlewood Caravan Site should also be accommodated. Relaxed mowing regimes and the retention of deadwood across other parts of Narberth Castle would provide additional habitats for pollinators.

NAR3 - Enhance the biodiversity value of Towns Moor

5.67 Refer to Kickstarter Projects.

NAR4 - Introduce a circular walk at Narberth Castle

5.68 Utilise existing PRoWs to create a circular walk to the south east of Narberth from Tabernacle Lane. The route would move south across the fields towards Brookside & Castlewood Caravan Site before connecting back up through Narberth Castle towards Market Street. Enhanced wayfinding and improved surfacing provision should be incorporated as part of a recreational route, providing a connection from Brookside & Castlewood Caravan Site to the town centre.

NAR5 - Provide a circular walk to the north west of Narberth

5.69 Land to the north west of the settlement is devoid of PRow connections to the wider countryside. The opportunity therefore exists to create a new circular route following the alignment of existing wooded ditches and tracts of plantation between Ruchacre, Flimstone and back towards Jacob's Park and Rushacre Plantation. This proposals should support proposals to deliver a shared-user path along Redstone Road into Narberth.

NAR6 - Establish a community orchard

5.70 Working in partnership with a range of stakeholders, identify a location for a community orchard within the town. Proposals should seek to deliver a community allotment / orchard which would perform a vital role in connecting local people to the process of food production. Where possible, planting margins should be left as uncut, green roofs introduced in sheds and bird feeders added to attract wildlife. Pesticide and herbicide use would be discouraged.

NAR7 - Promote the greening of Narberth town centre

5.71 Refer to Kickstarter Projects.

NAR8 - Enhance the setting of Bloomfield Community Centre

5.72 Swathes of wildflower meadow should be created to enhance the green banks and plots within the curtilage of Bloomfield Community Centre. This intervention would provide additional habitat and connectivity across Narberth for pollinators. Additional tree planting should also be provided within the adjacent green verges within the car park.

NAR9 - Create links with Narberth Station

5.73 Create an enhanced pedestrian link between Narberth town centre and Narberth Station. This should include options for road widening, footpath extensions and traffic calming along Station Road (such as a continuation of the 30mph speed limit past the junction with Kiln Park Road). Green traffic calming options along the A478 and Kiln Park Road should also be considered, with the aim to provide an additional route to the station and Narberth School. Urban greening and small-scale street tree planting at Narberth Station should be used to promote a more welcoming gateway.

NAR10 - Enhance the biodiversity value of the rugby ground perimeter

5.74 Prepare the ground for wildflower seeding and adopt a relaxed mowing regime around the periphery of the rugby fields. This would provide additional habitat for pollinators through the creation of wildflower meadow, whilst having no impact on sporting and spectator activities.

NAR11 - Promote the greening of Ruchacre Enterprise Park

5.75 Work with tenants and business owners at Ruchacre Enterprise Park to identify areas for additional tree planting and greening opportunities. Deliver tree planting within areas of close mown grass and encourage relaxed mowing regimes. Explore opportunities to diversify hedges by introducing additional species and hedgerow trees where space permits. Explore 'meanwhile' uses for vacant land, for example, wildflower meadows.

NAR12 - Create a green gateway at the A478 and Kiln Park Road junction

5.76 Develop wildflower-rich verges at the junction of the A478 and Kiln Park Road to promote benefits to pollinators whilst also creating a welcoming gateway into Narberth.

NAR13 - Deliver pollinator-friendly approaches at Narberth C.P. School

5.77 Working in conjunction with Narberth School, build on their existing Eco Code and allotment to provide additional habitat for pollinators. This should include making and planting seed bombs, creating log piles and building bug hotels. The introduction of wildflower meadows and relaxed mowing regimes should be implemented within the areas of close-mown grass at the entrance and within the car park of the school.

NAR14 - Introduce riparian tree planting and wetlands at Narberth Bridge

5.78 Refer to Kickstarter Projects.

NAR15 - Promote tree planting at Cox Hill and Garfield Gardens

5.79 Additional options for tree planting within grass verges and adjacent shared-user paths on Cox Hill and Garfield Gardens should be explored. Ensure suitable species are selected if adjacent to road carriageways e.g. small to medium height with upright crowns. This should be accompanied with bulb and plug planting beneath the trees to provide additional pollinator and visual interest.

NAR16 - Replace the missing tree adjacent to Narberth War Memorial

5.80 A tree pit currently lies vacant adjacent to the Narberth War Memorial. This should be filled with a replacement specimen tree which is appropriate to the constrained urban setting e.g. whitebeam (*Sorbus aria*), field maple (*Acer campestre*) and silver birch (*Betula pendula*).

NAR17 - Introduce rain gardens, street trees and permeable paving in Townsmoor Car Park

5.81 The large car park within Townsmoor is dominated by hardstanding and devoid of trees and other urban greening interventions. Limited tree planting is

also evident on the green itself and is located in an area prone to waterlogging. These areas should be targeted with attenuation ponds that would form water features for the local community as well as other urban greening interventions. Sustainable Drainage Systems (SuDS) interventions which act to divert storm water from combined sewers would also help to reduce pressure on infrastructure within Narberth in times of flooding. Proposals should ensure the integration of the proposed shared-user path connecting Moorfield Road with the Narberth to Blackpool Mill route.

NAR18 - Deliver enhancements to St. Andrews Churchyard

5.82 Working in conjunction with St. Andrew's Church, Narberth Town Council and the Friends of Narberth Churchyard, proposals should be developed to enhance the site for recreational and biodiversity benefits. The opportunity exists to increase site accessibility through the implementation of path network improvements and the introduction of additional seating. Proposals should also seek to maximise the biodiversity of the site through softworks improvements and the establishment of wildflower habitat

Chapter 6

Newport

Figure 6.1: Newport



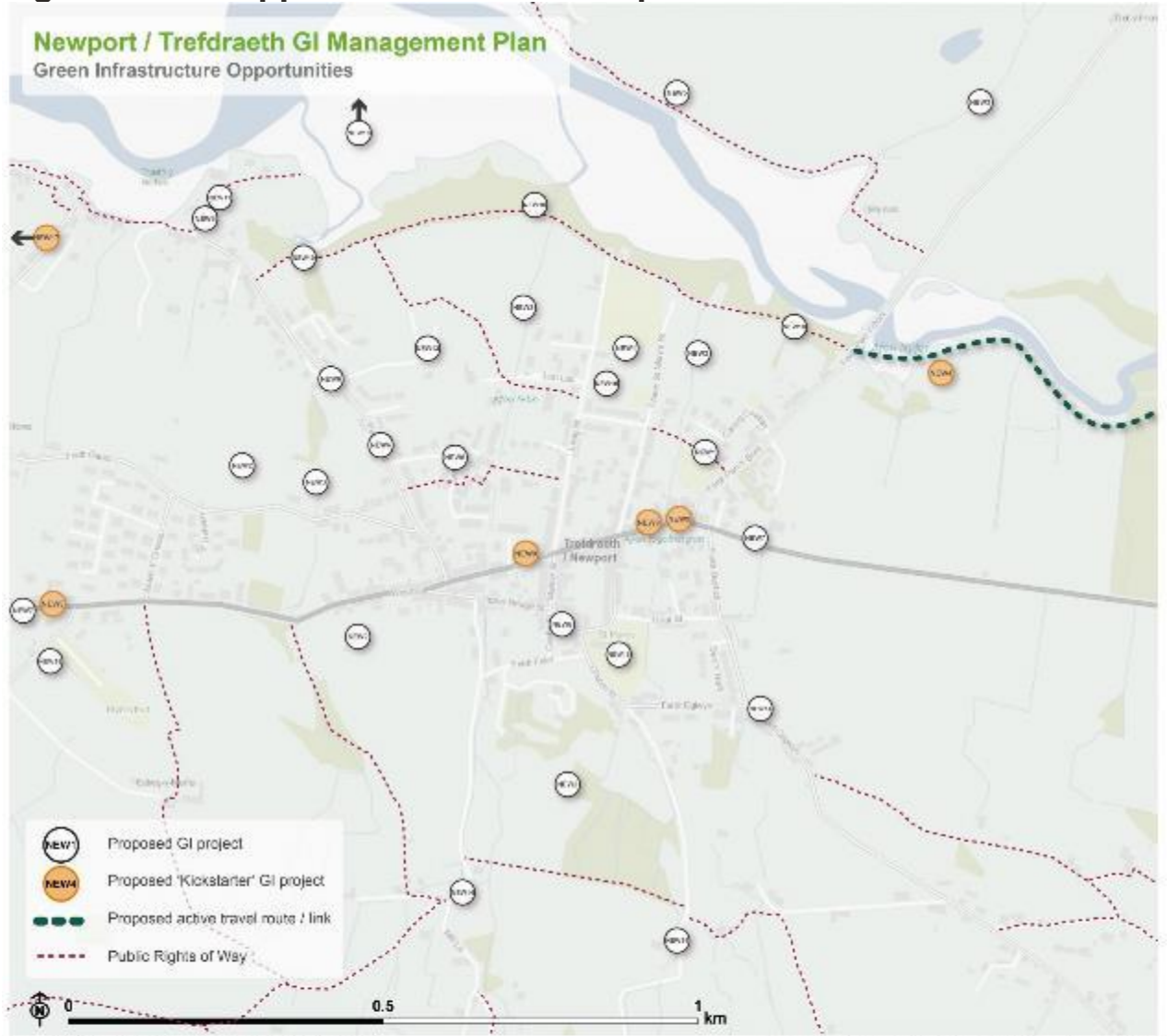
A Portrait of Newport's Green Infrastructure

6.1 Newport is a small town located on the northern coast of Pembrokeshire, at the mouth of the River Nevern. With 12th century origins, the town contains multiple listed buildings within the Newport and Newport Parrog Conservation Areas. The Newport Conservation Area covers much of the town centre, whereas the Newport Parrog Conservation Area follows the seawall in the north

towards Parrog. Situated within a low-lying area in proximity to the sandy river estuary, the town commands north easterly views across Newport Bay. Located within the Pembrokeshire Coast National Park, the town also has strong recreational links to the wider landscape.

6.2 Although a handful of public open spaces exist within the settlement core, the estuary and coastline to the north offer a significant recreational corridor. This includes a section of the Pembrokeshire Coast Path, a 186-mile National Trail. To the south of the town is a large area of open access land at Carningli Mountain which is located within the Preseli Hills and is popular with walkers. A number of public footpaths link these areas north-south and offer some connections through the town centre and towards the edge of the Nevern Estuary. Additionally, a National Cycle Network (NCN) route 82 connects the Preseli Hills to the eastern edge of Newport before continuing on towards the town of Nevern in the east, offering access to the wider countryside.

Figure 6.2: GI Opportunities within Newport



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| <ul style="list-style-type: none"> NEW1 Introduce small scale boundary planting at the skatepark and playground NEW4 Enhance circular riverside routes NEW7 Introduce small scale verge planting at approach to Newport from the A487 NEW10 Create woodland ground flora along the River Neve PRoW NEW13 Promote the re-wilding of private gardens NEW16 Champion Brynhydyd Cemetery as a bee-friendly site NEW19 Introduce Sustainable Drainage Systems (SuDS) interventions to help alleviate Combined Sewer Overflow (CSO) discharges | <ul style="list-style-type: none"> NEW2 Enhance connections between existing parcels of woodland, including ancient woodland NEW5 Explore active travel connections to Newport Beach NEW8 Diversify planting at the Community Gardens NEW11 Promote reduced mowing at the Barony of Comaes open space NEW14 Introduce wayfinding to Carnelli Common and Presell Hills NEW17 Create a wetland adjacent to the Cwm Sewage Pumping Station (SPS) | <ul style="list-style-type: none"> NEW3 Introduce riparian woodland buffers and field margin opportunities for flood alleviation NEW6 Introduce street tree planting and 'wilder' verges on Parrog Road NEW9 Introduce native flower planters at bus stops and rest stops NEW12 Establish a community allotment for people and wildlife NEW15 Support the establishment of a Ysgol Bro Ingli nature garden NEW18 Newport Sands and dunes stabilisation |
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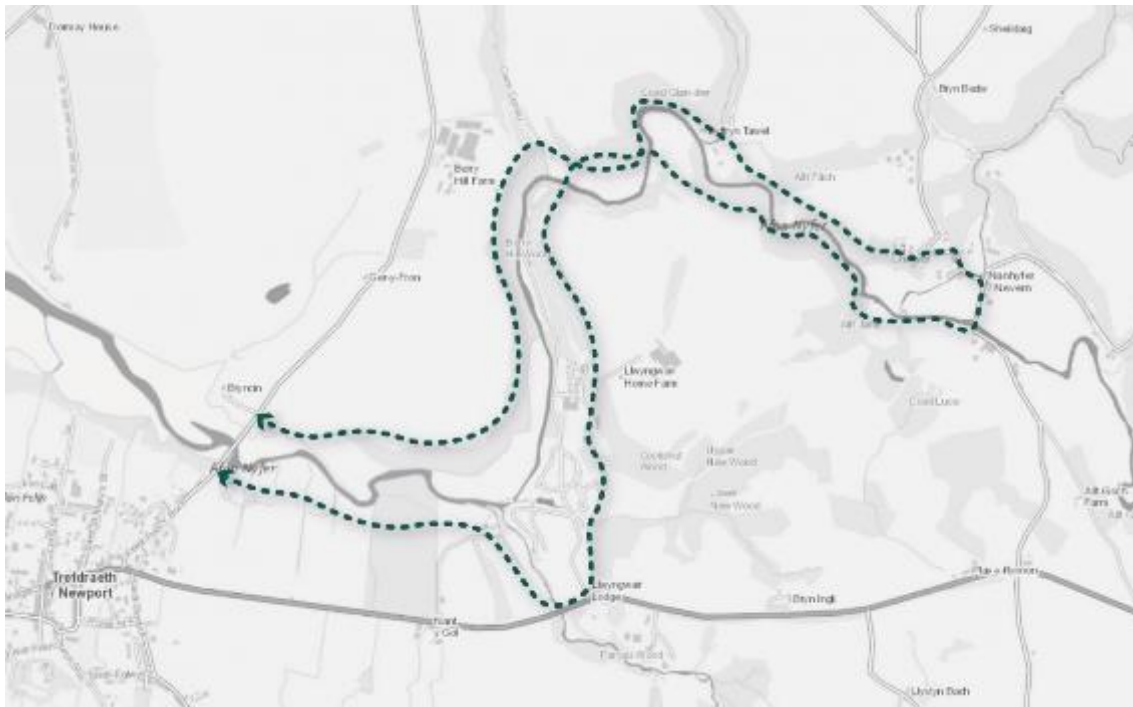
Kickstarter Projects

NEW4 – Enhance circular riverside routes

6.3 Building on the recently opened Llwybr Pwll Cornel public footpath which follows the northern edge of the Afon Nyfer, to the east of Pen-y-Bont, the opportunity exists to extend the existing riverside pathway on the southern side of the watercourse. Created in 2021 by the Pembrokeshire Coast National Park Authority (PCNPA), the newly implemented recreational route to the north of the river consists of an unsurfaced informal path characterised by steep gradients in Berry Hill Wood. Through the establishment of linkages with the new Public Right of Way (PRoW) at Pont Newydd, an extension along the southern bank would create a circular walk and promote wider access to the countryside. Connections with the Pilgrims Path would also enhance the recreational opportunities of the Afon Nyfer. The design of the route offers the opportunity to promote accessibility and inclusivity for a range of users, including cyclists, walkers and wheelchair users.

6.4 The establishment of the circular route would enhance the recreational offer at both the local and strategic scale. The potential integration of a range of robust, low maintenance street furniture, interpretation, signage and incidental natural play features along the route would also help to transform the corridor into a recreational asset. However, the scheme would require an assessment of the natural habitat to determine if the introduction of public access is sustainable and should be promoted. Potential conflicts between biodiversity and recreational access opportunities would need to be assessed. Consideration should be given to the introduction of a 'code of conduct' for appropriate behaviour on ecologically sensitive sections of the route to help encourage more responsible recreation.

Figure 6.3: NEW4



Benefits of the project

6.5 Benefits of the project, as depicted in Figure 6.4 below, include:

- Provides active travel opportunities
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 6.4: Benefits



Delivery mechanisms

6.6 Significant external funding and allocation of staff resource would be required, underpinned by cooperative landowners and a sustainability assessment to determine the appropriateness of introducing public access.

Potential partners

- PCNPA
- Landowners
- Natural Resources Wales (NRW)

Outline cost

High cost = >£1 million

Potential funding opportunities

- Natural Resources Wales

- PCNPA
- Transport for Wales

Timescale

Long-term = >5 years

6.7 Following consultation, landowner engagement, surveys and a collaborative design process, the project will likely take around 5 years to deliver.

Potential constraints

6.8 The project is likely to be complex, with competing demands. This includes the requirement for significant external funding and liaison with local landowners to ensure buy-in on privately owned land. It would be necessary to engage with landowners and land occupiers in order to present these opportunities and discuss their impacts on current land-use. However, a key unknown for the project would be the time needed to gain these landowner consents.

6.9 The project would also require localised vegetation clearance along some sections of the route. This would need to be undertaken to avoid the bird nesting season and in liaison with an ecologist or Ecological Clerk of Works (ECoW).

Maintenance and stewardship

6.10 Ongoing annual maintenance of the hard surfacing of the route would be required to ensure access is maintained throughout the year. Landscape management works would also be required to ensure the retention of sightlines across the route.

Monitoring for success

6.11 The opportunity exists to install sensors or counters to monitor the usage of the route as part of the wider active travel network within the county. This approach would help measure the success of the substantial investment and inform the long-term strategy and delivery of similar projects in the future.

Next steps

6.12 A sustainability assessment would form the initial task in the development of the project. If deemed acceptable following the results of the assessment, a feasibility study and optioneering exercise should then be undertaken. This should also incorporate an ecological assessment and tree survey to BS5837: 2012 to examine the implications on local biodiversity and existing tree cover. Working with the community, opportunities for community-led design workshops should be explored.

Figure 6.5: Newport



NEW9 – Introduce native flow planters at bus stops and rest stops

6.13 The urban setting of the town centre provides a barrier for the movement of pollinators from east to west. Opportunities for wildflower verges or more continuous habitat creation are constrained by narrow pavements within the existing street pattern. However, the opportunity exists to introduce planters with native pollinator-friendly shrubs adjacent to bus stops (e.g. at the west of the town, the Castle Inn and the Golden Lion Hotel) and rest stops (e.g. by the bench and cycle racks next to Castle Inn, by Llys Meddyg Hotel, outside the Post Office) to enhance biodiversity value. Local residents and businesses should also be encouraged to install native flower rich window boxes or hanging

baskets, which would also increase the visual appeal of their shop fronts or homes.

6.14 Initiatives such as ‘Buzz Stops’ in Cornwall, ‘Bee Stops’ in cities such as Derby and Leicester or ‘Edible Bus Stops’ in Stockwell, London, have all helped create pollinator habitat and increase awareness of the importance of pollinators. Such similar branding in Newport could help achieve buy-in from residents.

6.15 Larger perennial plants should be placed in the centre of planters, with plants of decreasing size further towards the outside, with trailing plants at the edge. If the planter is against a wall, the largest plants should be placed at the back. Where space permits, these could be combined to function as rain gardens to help manage surface water run-off.

Figure 6.6: NEW9



Benefits of the project

6.16 Benefits of the project, as depicted in Figure 6.7 below, include:

- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience

- Play, education and interaction with nature
- Reinforces a sense of place
- Improves health and wellbeing

Figure 6.7: Benefits



Delivery mechanisms

6.17 Planters and hanging baskets should be delivered in accordance with the delivery section of the Pollinator Strategy. Local businesses may be interested in sponsoring planters outside their shops in return for advertising or promotion.

Potential partners

- Newport Town Council
- Newport Environment Group
- Pembrokeshire Nature Partnership
- Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team
- Local homeowners
- Local businesses

Outline cost

Low cost = <£250k

6.18 Given the constrained space within the town centre, planters are likely to be smaller in size and so relatively inexpensive. The cost for native bulbs or plug plants would be reduced if local businesses were involved in sponsorship.

Potential funding opportunities

- Local Places for Nature Fund; and
- Local business sponsorships

Timescale

Quick win = <1 year

6.19 Interventions can be delivered almost instantaneously following some business and resident engagement.

Potential constraints

6.20 For the planters to successfully establish, maintenance would be required. Without this, they may become visually unappealing and lose community support. As the planters would be located in public locations, they may also be disturbed or damaged by antisocial behaviour.

Maintenance and stewardship

6.21 Throughout the spring and summer, planters should be watered daily. When plants are in flower they may benefit from a high potassium liquid feed fortnightly. Containers or pots should have good drainage to prevent waterlogging. To prevent plants from getting too wet and cold over winter, they should be raised slightly off the ground and placed against the shelter of a wall. Local businesses or homeowners within the closest proximity to the planters could be engaged to assist with this maintenance.

Monitoring for success

6.22 The success of the planters could be recorded by the number of pollinating insects they attract and the diversity of species. The Flower-Insect Timed Counts (FIT Counts) methodology has been developed by the UK Pollinator Monitoring Scheme. This involves counting the insects visiting one of the 14 flower species target flowers within a 50cm by 50cm square patch for 10 minutes in good weather. Local people could partake in this as a citizen science programme.

6.23 Success could also be monitored by recording how many additional planters have been installed by local residents or businesses.

Next steps

6.24 Review the delivery section of the Pollinator Strategy to determine the process and review case studies relating to the installation of planters and hanging baskets.

6.25 Consult with South Wales Trunk Road Agent (SWTRA) and PCC StreetCare / Amenity Maintenance Team.

6.26 Engage with local residents and businesses to establish interest in sponsoring and/or maintaining planters within the town centre.

Figure 6.8: Newport



NEW17 – Create a wetland adjacent to the Cwm Sewage Pumping Station (SPS)

6.27 Newport lies immediately south of the Afon Nyfer Estuary, within the boundary of the Pembrokeshire Coast National Park and in close proximity to the Newport Cliffs Site of Special Scientific Interest (SSSI) and Cardigan Bay Special Area of Conservation (SAC). The town currently utilises a long sea outfall located at the Parrog to discharge excess sewer and storm outflows.

6.28 Cwm Sewage Pumping Station (SPS) located to the north west acts as a terminal station receiving all the combined flows from the Newport catchment. Currently flows of 14l/s are transported to Newport's Waste Water Treatment

Works 800m to the south. This treated effluent is then returned and discharged via the long sea outfall. Whilst this system is operational most of the time, in periods of excess flow combined storm overflow events occur, where untreated effluent bypasses treatment and flows directly into the sea outfall. In 2021, 2,423.25 total hours of such overflows occurred at the Cwm Sewage Pumping Station.

6.29 Conversion of farmland adjacent to the Dwr Cymru Welsh Water infrastructure into wetland habitat would provide a secondary treatment for treated effluent, and also a buffer for storm flows before they discharge to the sea outfall. The proposed location of this would need careful consideration, including comprehensive stakeholder and community consultation.

6.30 The potential also exists to work in conjunction with the CLEAN Afon Nyfer project to incorporate citizen science monitoring of the wetlands to examine its impact on the effluent outfall and associated water quality.

Figure 6.9: NEW17



Benefits of the project

6.31 Benefits of the project, as depicted in Figure 6.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 6.10: Benefits



Delivery of nature-based solutions and ecosystem services

6.32 Wetlands can aid flood alleviation, acting as a store of excess water in periods of heavy rainfall in addition to their primary function of nutrient stripping and cycling. These habitats also provide multiple biodiversity benefits.

6.33 Constructed wetlands, if designed correctly, can achieve sustainable effluent treatment that provides a reduction in contaminant concentration similar to more complex chemical-based or mechanical mechanisms. The effluent from sewage treatment facilities is typically rich in nutrients and wetlands can be used to help alleviate this issue in sensitive areas such as the Afon Nyfer Estuary and Cardigan Bay SAC

Delivery mechanisms

6.34 The cooperation and involvement of Dwr Cymru Welsh Water would be critical to the success of this project, and hence the first stage would be to engage with them and to draw together a feasibility study, looking at the required throughflow rates, the space available and the options associated with wetland design.

6.35 An appropriate design engineer should be consulted to provide a design of the wetlands. The potential area for the wetlands should be calculated and agreed with relevant landowners. Consultation with the local community should be undertaken to enable engagement with the plans. Contractors required to scope out the topography and excavate selected areas should be employed. Consideration of materials needed to create the wetlands such as substrate materials and vegetation should also be sourced as locally as possible.

6.36 The potential exists that this project could be used to create nutrient trading credits as a mechanism to wholly or partially fund the project, with a pilot scheme run by EEP-Ecobank for nutrient credits operating within the Milford Haven catchment although the status of this project is currently unclear.

6.37 Citizen science and combined storm overflow monitoring should be utilised to help inform and monitor the project. Although scientific studies are outside the scope of this phase of works, any information obtained by citizen science relating to the health of the local marine environment would also be welcomed to support this project. An ecological assessment of potential sites should be undertaken prior to selection.

Potential partners

- Afon Nyfer CLEAN
- Wildlife Trust of South & West Wales
- Dwr Cymru Welsh Water
- Natural Resources Wales (NRW)
- Pembrokeshire Coastal Forum
- Cardigan Bay Marine Wildlife Group

Outline cost

Low to medium cost = <£250k – £1 million

6.38 Costs would comprise land purchase or rent, specialist engineer design of the wetlands, procurement of planting and costs associated with excavation and installation of the wetlands.

Potential funding opportunities

- Dwr Cymru Welsh Water
- The Four Rivers for LIFE project
- Nutrient credits using Section 106 agreement
- National Lottery Community Fund
- Ofwat Innovation Fund

Timescale

Medium-term = 1-5 years

6.39 This anticipated programme length includes for time to enable design of the wetland, agreements with landowners, construction and planting of the wetland.

Potential constraints

6.40 A key constraint for the project would be securing landowner agreements. It would also be essential to ensure the wetlands are located adjacent to the sewage treatment infrastructure to avoid re-routing sewage outfalls that would increase time and costs of the project. Antibiotic-resistant bacteria accumulation in wetlands is a concern and should be considered in the design of the wetlands.

6.41 An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Maintenance and stewardship

6.42 Wetlands are fairly low maintenance with little to no running costs as they do not require power and are generally reliable self-adjusting systems. However, maintenance would be required a few times a year to remove debris from any outlets, replace any damaged pipes, remove any invasive plant species that may be outcompeting the wetland plants, reduce sediment accumulation and check the structural integrity of the structural aspects of the design. Ongoing agreements with Dwr Cymru Welsh Water or landholders for access would be crucial.

Monitoring for success

6.43 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science. Techniques could include monitoring of water quality using simple hand-held equipment.

Next steps

6.44 Dwr Cymru Welsh Water's collaboration would be critical to ensure the success of this project, and so the first step would be to enter into discussion with Dwr Cymru Welsh Water and sign up to a collaboration agreement. This may also enable access to funding for the project, either with Dwr Cymru Welsh Water or as part of the Ofwat Innovation Fund.

6.45 Engage with landowners to enter into agreements to purchase or rent their land. Engage with the local community to create support and 'buy-in' for the project.

Figure 6.11: Newport



Project Long List

NEW1 - Introduce small scale boundary planting at the skatepark and playground

6.46 The opportunity exists for tree planting along the boundaries of the skate park, playing field, playground and the areas between the tennis courts and playing field. This would include the planting of small fruit trees. Any planting should aim to maintain good sightlines across the site to maintain a sense of safety and natural surveillance. Any new planting should also consider local constraints, including the proximity to the Scheduled Monument.

NEW2 - Enhance connections between existing parcels of woodland, including ancient woodland

6.47 There are several parcels of woodland directly to the south and west of the settlement, including areas of tree cover adjacent to Newport Castle. Proposals should be developed to restore and connect areas of fragmented woodland through the establishment of additional areas of tree planting. Proposals should adopt 'right tree in the right place' principles to promote landscape integration and ensure the successful establishment of new woodland corridors.

NEW3 - Introduce riparian woodland buffers and field margin opportunities for flood alleviation

6.48 Whilst the majority of the town lies out of the flood zone surrounding the Afon Nyfer, flood events in 2014 affected roads and properties near to the Parrog. Measures such as upstream tree planting and increasing field margins should be located along watercourses to provide a buffer from adjacent agricultural land, as well as protecting from tidal surges and reducing bank erosion. This issue is of particular importance to the north of the estuary where agricultural field boundaries are less heavily vegetated. The project has the potential to respond to a number of potential harmful issues affecting marine life, including sediment and nutrient loads entering the environment. Further information could be used to modify the project to target potential areas of concern.

NEW4 - Enhance circular riverside routes

6.49 Refer to Kickstarter Projects.

NEW5 - Explore active travel connections to Newport Beach

6.50 At present, a walking route between Newport and Newport Beach is available along the Wales Coast Path. The opportunity exists to upgrade this route to the north of the River Nevern to accommodate walkers to encourage its use and reduce traffic congestion within Newport. Wayfinding signage which advertises approximate travel times to walk, for example, 30 minute walk between Newport Boat Club and Newport Beach, should also be installed.

NEW6 - Introduce street tree planting and 'wilder' verges on Parrog Road

6.51 Streets within Newport are generally narrow, often with little pavement space and constrained street tree planting opportunities. However, some residential areas along Parrog Road and Maeslingi Road provide good opportunities for street tree planting, installation of cycle parking and 'wilder' verges within existing soft landscape areas. Additional boundary planting at the Parrog Road Public Car Park would include planting in grass areas, as well as minor parking bay reconfiguration to allow for hardstanding removal.

NEW7 - Introduce small scale verge planting at approach to Newport from the A487

6.52 The A487 forms the primary route within the town, with active travel routes proposed along both the eastern and western approaches. Tree planting and modifications to the mowing regime to promote the growth of wildflowers should be considered on the wider areas of roadside verge on the approach into Newport from the west and east (beyond the 'Welcome to Newport' signs). This intervention would define the gateway to the settlement.

NEW8 - Diversify planting at the Community Gardens

6.53 The Newport Community Gardens at the intersection of Church Street and Castle Street provides a rare 'wilder' area in the centre of the town.

Replacement of ornamental plants in the lower paved area with native flowers and shrubs would provide increased value to pollinators. The mowing of the upper grassy area with the bench should be relaxed and wildflowers sown to create a range of pollinator habitats. The use of pesticides or herbicides should be avoided.

NEW9 - Introduce native flower planters at bus stops and rest stops

6.54 Refer to Kickstarter Projects.

NEW10 - Create woodland ground flora along the River Nevern PRow

6.55 Working in conjunction with the Newport Paths Group and the CLEAN project, introduce improvements to woodland management along the Wales Coast Path between Pen-y-Bont and Parrog. Maintain open areas and structural diversity, including bare ground and log piles, to allow light to reach native wildflowers and woodland ground flora. Opportunities to control and remove Japanese knotweed and skunk cabbage should be explored.

NEW11 - Promote reduced mowing at the Barony of Cemaes open space

6.56 The area of open space owned by the Barony of Cemaes next to the Newport Boat Club is frequently closely mown. Changes in landscape management practices to promote the establishment of wildflower meadow would maintain the function as a community space, whilst providing much needed habitat for pollinators. Similar meadow management regimes should be rolled out across other amenity grass areas within the town (as appropriate).

NEW12 - Establish a community allotment for people and wildlife

6.57 Work with the community to consider a potential location for a community allotment, meeting the demand for a community growing space. Successful delivery of this project would be dependent on locating a suitable site and undertaking an ecological assessment. Plot tenants should be encouraged to reduce the use of pesticides and herbicides, instead choosing to work organically. Maintaining an allotment provides a valuable opportunity to preserve wildlife habitats and encourage birds, bees and other pollinators. Additional opportunities for ponds, pollinator-friendly field margins and orchard trees should also be explored.

NEW13 - Promote the re-wilding of private gardens

6.58 Develop a wild web initiative across Newport's private gardens with a particular focus on second home owners to demonstrate how re-wilding can reduce maintenance. Leaflets should be distributed to homes in Newport setting out simple steps occupiers can take to enhance wildlife provisions in their

garden. For instance, residents should be encouraged to relax mowing regimes and participate in 'No Mow May', install small areas of water, log piles and wildlife boxes. The initiative should also be extended to caravan sites (as appropriate).

NEW14 - Introduce wayfinding to Carningli Common and Preseli Hills

6.59 Work in partnership with the Newport Paths Group, investigate proposals to enhance wayfinding to the wider countryside surrounding Newport (including to Carningli Common and Preseli Hills). Interpretation boards, including educational material and circular recreational route maps, should be incorporated to enhance the visitor experience.

NEW15 - Support the establishment of a Ysgol Bro Ingli nature garden

6.60 Work with Ysgol Bro Ingli to identify areas of land for habitat enhancements; including areas of reduced mowing, log piles and insect hotels. Should sufficient space be identified, a sensory nature garden should be introduced with opportunities for outdoor classroom space, nature education equipment, small-scale food growth and sensory play.

NEW16 - Champion Brynhyfyd Cemetery as a bee-friendly site

6.61 Brynhyfyd Cemetery is currently recognised as a Bee Friendly location due to the work of partners in managing the surrounding setting for pollinators. This work should be supported in order to help maintain this accreditation by managing wildflower meadows and increasing pollinator habitat (such as bare

earth and dead wood). Opportunities to replicate this good practice within St Mary's Churchyard should also be explored.

NEW17 - Create a wetland adjacent to the Cwm Sewage Pumping Station (SPS)

6.62 Refer to Kickstarter Projects.

NEW18 - Newport Sands and dunes stabilisation

6.63 Newport Sands and the associated dunes current shoreline management plan until 2025 promotes the principle of 'holding the line' with a 'managed realignment' planned by 2050 with the expected erosion of the Bennet sand spit. The opportunity exists to include sand dune stabilisation techniques, such as the planting of semi-natural species to limit erosion and managing walkways to prevent dune erosion. This approach has the potential to benefit wildlife, provide tourism benefits and reduce impacts from adverse weather events on the local environment.

NEW19 - Introduce Sustainable Drainage Systems (SuDS) interventions to help alleviate Combined Sewer Overflow (CSO) discharges

6.64 Sustainable Drainage Systems (SuDS) interventions which act to divert storm water from Combined Sewer Overflows (CSOs) would help to reduce pressure on infrastructure within Newport in times of flooding. The integration of SuDS interventions would help to reduce the volume of surface water which is directly channelled through a networks of pipes. The potential also exists to

work in conjunction with Newport Town Council to explore locations for SuDS interventions within the townscape.

Chapter 7

Neyland

Figure 7.1: Neyland



A Portrait of Neyland's Green Infrastructure

7.1 The compact town of Neyland lies at the eastern end of Milford Haven, near the mouth of the River Cleddau. The town is surrounded by hedgerow-bound

agricultural fields to the north and west, however, it retains somewhat of an industrial character as historically it was an important shipping and rail terminus. The Neyland Conservation Area is contained along the southern edge and within central portions of the town, with many listed buildings related to the now defunct rail infrastructure. Regular, linear street patterns are common across the southern extents of the town, reflecting the sloping topography as the land meets the coast. From here, views are available along streets and from properties across the estuary and towards the port at Pembroke Dock located on the southern shore. Within the north of the town, the street pattern is characterised by a looser suburban form.

7.2 Neyland is sited in proximity to two important waterways, the Milford Haven estuary along the southern edge of town, and Westfield Pill, which forms the eastern town boundary. The Milford Haven estuary is part of the Pembrokeshire Marine Special Area of Conservation (SAC), as well as the Milford Haven Waterway Site of Special Scientific Interest (SSSI), whose designated extent, continues north, along the stream corridor of Westfield Pill.

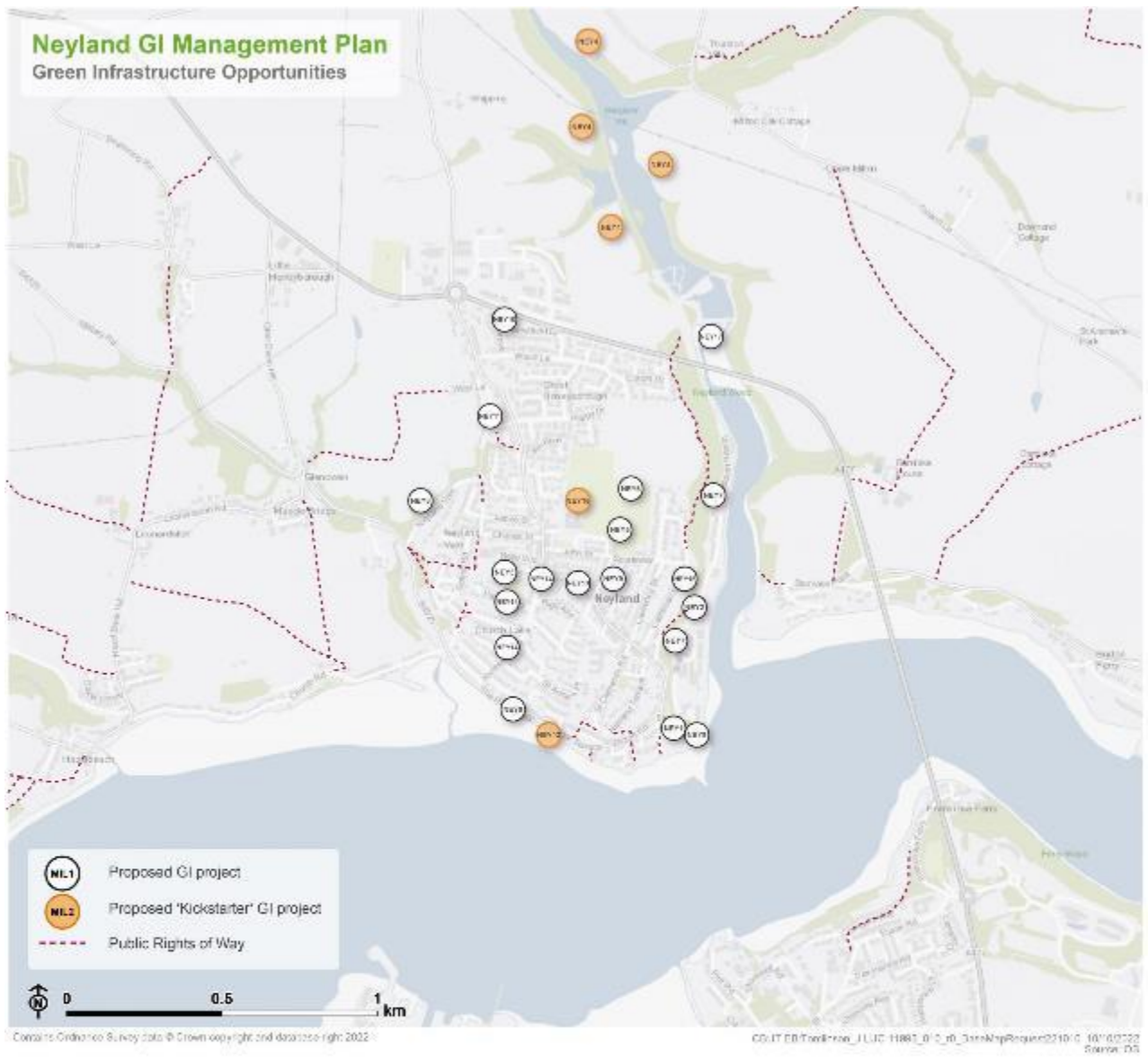
7.3 Open spaces within Neyland are small and limited in number, with recreational fields associated with the school and athletic grounds at the northern end of the town and a small recreation space at Harbour Close Park. The Pembrokeshire Coast Path, a promoted National Trail, skirts along the town's southern edge before continuing along the Milford Haven estuary to the east and west. A stream corridor defines the western boundary of the town at Neyland Vale. This wooded valley, acts as an important wildlife corridor connecting the wider countryside with the Milford Haven and its associated wildlife designations. Westfield Pill marks the eastern boundary of the town and contains Neyland Yacht Haven, a marina for pleasure boats. The banks of the pill also host a section of the Pembrokeshire Coast Path as well as the start of the off-road Brunel Trail cycle link which connects Neyland with Haverfordwest to the north. Along with areas of dense ancient woodland, Westfield Pill also contains the Westfield Pill Nature Reserve which is known to host otters, bats and a rich variety of invertebrates, reptiles, amphibians and birds.

7.4 Few Public Rights of Way (PRoW) connect the north of the settlement with the wider landscape with most of the town's network concentrated along the

Chapter 7 Neyland

waterways and to the west of the town within the largely pastoral landscape. However, there are cycle routes which branch off the Pembrokeshire Coast Path and extend east and west along the A477 to offer wider connectivity.

Figure 7.2: GI Opportunities within Neyland



- | | | |
|--|--|--|
| NEY1 Enhance the greening of Brunel Quay | NEY2 Improve access from the waterfront to Westfield Pill | NEY3 Enhance Harbour Close Park |
| NEY4 Utilise nature-based solutions to address water quality issues | NEY5 Introduce tree planting at Neyland Community Hub and Athletic Ground | NEY6 Improve access to the council owned green space to the rear of the Athletic Ground |
| NEY7 Create a pollinator pathway along the Brunel Trail | NEY8 Enhance habitat and access at Neyland Vale Common | NEY9 Expand the number of native flowerbeds |
| NEY10 Enhance the biodiversity value of Westfield Drive green space | NEY11 Introduce wildflower meadows and trees at Honeyborough Green | NEY12 Create wildflower verges along The Promenade |
| NEY13 Enhance greening of the High Street | NEY14 Promote the greening of Riverside Avenue | NEY15 Provide access and biodiversity enhancements to the Cambrian Road green space |
| NEY16 Introduce tree planting and street greening at Neyland Community School | NEY17 Extend Westfield Pill Nature Reserve | |

Kickstarter Projects

NEY4 – Utilise nature-based solutions to address water quality issues

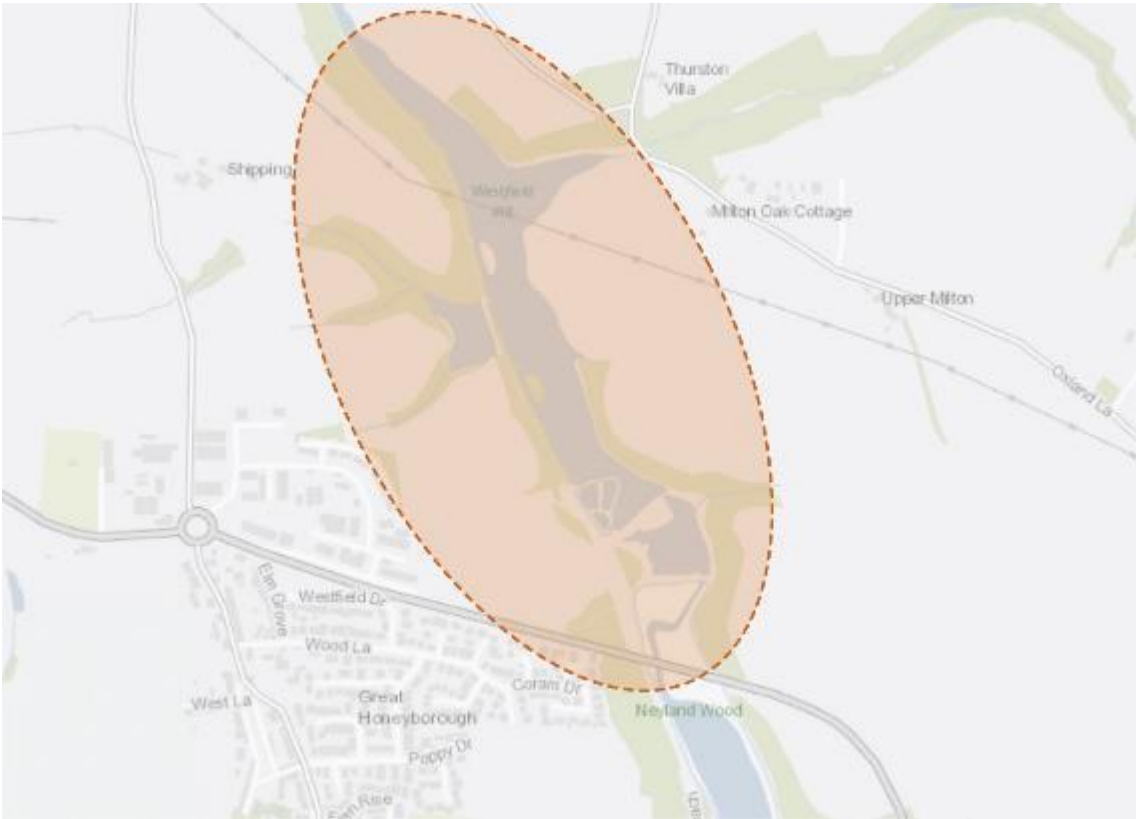
7.5 East of the settlement of Neyland lies the Westfield Pill Nature Reserve, which is of national importance for the assemblage of overwintering wildfowl and invertebrates. The site provides a range of important habitats, both within the lake and on the surrounding land. It also drains into Milford Haven, which is designated as a Special Area of Conservation (SAC). The adjacent farmland is characterised by a series of steep slopes, and previous projects have identified the opportunity to implement changes to land management that would benefit water quality, reduce flood risk and decrease the risk of siltation. The entire catchment of Westfield Pill should be targeted for interventions, with a particular initial focus on the Pembrokeshire County Council (PCC) owned farm lying east of Neyland.

7.6 A process of opportunity mapping using remote-sensing data has already been undertaken, identifying areas where changes in land management could deliver benefits. An initial data-gathering stage across the catchment of Westfield Pill would provide local-scale ground-truthing of these opportunities. This data-gathering and opportunity mapping stage could then swiftly be carried through to delivery of a range of land-use change and interventions, which may include;

- Creating riparian buffer strips, reducing grazing in proximity to watercourses;
- Formalising areas of livestock watering, so enabling the erection of fences along watercourse to protect them from bank erosion, bank poaching and manure impact;
- Planting of field margins and shelter belts with trees / shrubs to increase water retention; and

7.7 Creating natural dams within small watercourses, slowing flow and increasing diversity of habitats within the landscape.

Figure 7.3: NEY4



Benefits of the project

7.8 Benefits of the project, as depicted in Figure 7.4 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Carbon sequestration & climate mitigation

Figure 7.4: Benefits



Delivery of nature-based solutions and ecosystem services

7.9 Land use management since the Second World War has involved increased drainage of the land, in a drive to maximise the efficiency of farmland. This has led to the reduction in the diversity of habitats, the loss of wetlands, wet-grassland and associated wet terrestrial habitats. It has also increased flood risk, as it increases the speed and volume of water flow down catchments, reducing the buffering effect of the landscape during heavy and prolonged rainfall events. Increased drainage of wet soils also has a detrimental effect on the ability of that soil to sequester carbon.

7.10 Through the use of techniques such as riparian buffer strips, planting of shelter belts and field margins, the ability of the landscape to absorb and buffer rainfall and surface runoff would be significantly increased. This would have a concomitant beneficial impact on flood risk, water quality and carbon sequestration, as re-wetting of wetland soils would increase their capacity to absorb and lock-in carbon.

Delivery mechanisms

7.11 Initially, it is proposed that the project could be targeted on a local, site-specific level by undertaking a survey to ground-truth the presence and scale of opportunity areas that have been identified to date using remote-sensing techniques. This survey could be undertaken by suitably trained citizen scientists, Pembrokeshire County Council (PCC) staff or by an external specialist consultant. Once areas of key opportunity have been ground-truthed and defined, it would be necessary to engage with landowners and land occupiers / graziers in order to present these opportunities and discuss their impacts on current land-use. This may lead to the loss of some opportunities for reasons of commercial and physical agricultural constraints.

7.12 The proposed physical interventions and amendments to land management should be delivered by the landowners themselves, or by external agricultural contractors.

Potential partners

- Wildlife Trust of South and West Wales
- Natural Resources Wales (NRW)
- West Wales Rivers Trust
- Pembrokeshire Coastal Forum

Outline cost

Low cost = <£250k

7.13 It is envisaged that this project may cost tens of thousands or less, dependent upon the area of catchment targeted for interventions. Costs would comprise some limited specialist advice / land agent fees, fencing and tree

planting costs and possible costs associated with the installation of alternative livestock watering apparatus.

Potential funding opportunities

- Emerging Welsh Government Sustainable Farming Scheme
- National Forest for Wales – The Woodland Investment Grant (National Lottery Heritage Fund – Round 1)

Timescale

Quick win = <1 year

7.14 Physical interventions could be delivered within a single year. A key unknown for the project would be the time taken to gain landowner / occupier / grazier agreements / consents.

Potential constraints

7.15 A key constraint for the project would be landowner / occupier / grazier agreements, as there may be a perceived risk to farm viability associated with some loss of land to riparian margins / shelter belts / field margin planting etc. There may also be resistance to alteration of watercourses with respect to land drainage concerns. These concerns should be countered with the availability of agricultural payments for environmental goods and services, and hence the delayed launch of the Welsh Government's Sustainable Farming Scheme is a potential constraint in this regard.

Maintenance and stewardship

7.16 Maintenance of the softworks and wetland would be required as part of the 60 month establishment phase, including the replacement of failed trees.

Monitoring for success

7.17 Subject to the availability of funding, monitoring of the success of the project should be undertaken through simple citizen science, with suitable support. Techniques could include the monitoring of water quality using simple hand-held equipment, or the installation of a simple stream-gauge to monitor streamflow, for example.

Next steps

7.18 Secure limited funding (£1k to £10k) to ground truth remote sensing across the catchment, creating a priority list of areas for intervention.

7.19 Engage with landowners / occupiers / graziers and enter into agreements to deliver interventions on their land.

Figure 7.5: Neyland



NEY12 – Create wildflower verges along The Promenade

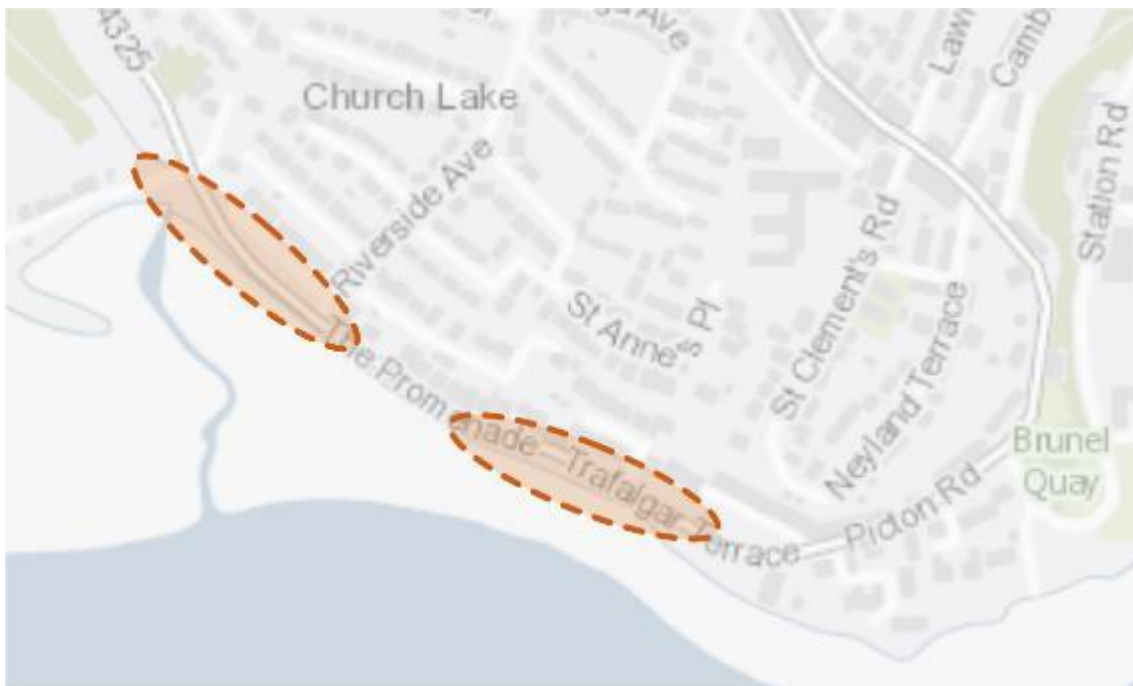
7.20 The gradient of the grassed bank bordering The Promenade is too steep to provide a recreational function, including land lying between Church Lakes and Riverside Avenue. Relaxation of the existing mowing regime would encourage a longer and more diverse sward that would provide habitat for a variety of species, namely pollinators. To increase species diversity, native wildflower seed should be sown, or wildflower turf laid. Consideration should also be given to the use of salt-tolerant wildflower species due to the proximity to the coast. The inclusion of yellow rattle within the species mix would help control the establishment of vigorous grasses. In the spring and summer, the establishment

of wildflower meadows would also enhance the appearance of the town for those leaving or entering via the B4325.

7.21 Signage plays an important role in communicating to the public the benefits of wildflower meadow establishment. This can help overcome perceptions of ‘messiness’ by raising awareness regarding the importance of pollinators.

7.22 On the lower slopes, additional small-scale tree planting would be appropriate. However, views across Milford Haven should be retained.

Figure 7.6: NEY12



Benefits of the project

7.23 Benefits of the project, as depicted in Figure 7.7 below, include:

- Investment & enhanced visitor experience

- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Reinforces a sense of place
- Improves health and wellbeing

Figure 7.7: Benefits



Delivery mechanisms

7.24 Annual cuts of wildflower meadows should be integrated into the work programme of the Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

7.25 Wildflower meadows and the community orchard should be delivered in accordance with the delivery section of the Pollinator Strategy.

7.26 There may be a requirement to reduce soil fertility to promote the successful establishment of wildflower meadows. This could be achieved by stripping away the top 5-10 cm of soil in the area where the wet meadow would be created. Autumn is the optimum time to sow wildflower seeds to provide the earliest display of wildflowers the following year. However, wildflower seeds can be planted throughout the year and would begin to bloom after approximately 60-80 days.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- Tree Wardens Pembrokeshire
- Neyland Town Council
- Pembrokeshire Nature Partnership
- Pembrokeshire Meadows Group

Outline cost

Low cost = <£250k

7.27 As described in the delivery section of the Pollinator Strategy, wildflower meadows can in fact save money from reduced mowing. Investment in a cut and collect machine may also aid overall savings on labour costs from gathering cuttings. Cost of wildflower seed is likely to be low, although this figure would be higher if plug plants or wildflower turf are utilised instead.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund

Timescale

Quick win = <1 year

7.28 Depending on soil fertility and if wildflowers are sown after Autumn, it may be the case that the seeds do not bloom until after their first winter season.

Potential constraints

7.29 Consideration should be given to how to gather the cuttings and remove them from the wildflower meadow to prevent enrichment of the soil. The most efficient way to do so is with a cut and collect mower but this requires capital investment. Otherwise, arisings should first be gathered into rows which are then gathered into individual stacks. This can be labour intensive.

7.30 There can be a perception that wildflower meadows are untidy or messy, especially before and after flowers have bloomed. This could result in complaints from the public. Signage to communicate the benefits of growing wildflower meadows can help increase understanding and education regarding the importance of pollinators.

Maintenance and stewardship

7.31 A wildflower meadow requires a cut and lift at the end of the season. This is typically in September. The arisings should ideally be left for seven days to shed seed before removing. A second cut and lift may be required in early spring to remove winter growth. Care is required when mowing as small mammals, amphibians and reptiles may be hiding in the grass. Some birds nest in larger meadows, so mowing should not be undertaken until after the beginning of August. Dominant species such as nettle and dock should be managed through selective scything or hoeing.

7.32 Use of fertilisers, pesticides and insecticides should be avoided.

Monitoring for success

7.33 Monitoring should align with national schemes. The UK Pollinator Monitoring Scheme runs Flower-Insect Timed Counts (FIT Counts). This involves counting the insects visiting one of the 14 flower species target flowers

within a 50cm by 50cm square patch for 10 minutes. Local residents and schools could be encouraged to participate in this as a citizen science initiative. Alternatively, plant 'indicator species' can be recorded within a 1km square to monitor species diversity.

Next steps

7.34 Review the delivery section of the Pollinator Strategy to determine the process and review case studies relating to the creation of wildflower meadows. Engage with the PCC StreetCare / Amenity Maintenance Team to communicate the proposed mowing regime.

Figure 7.8: Neyland

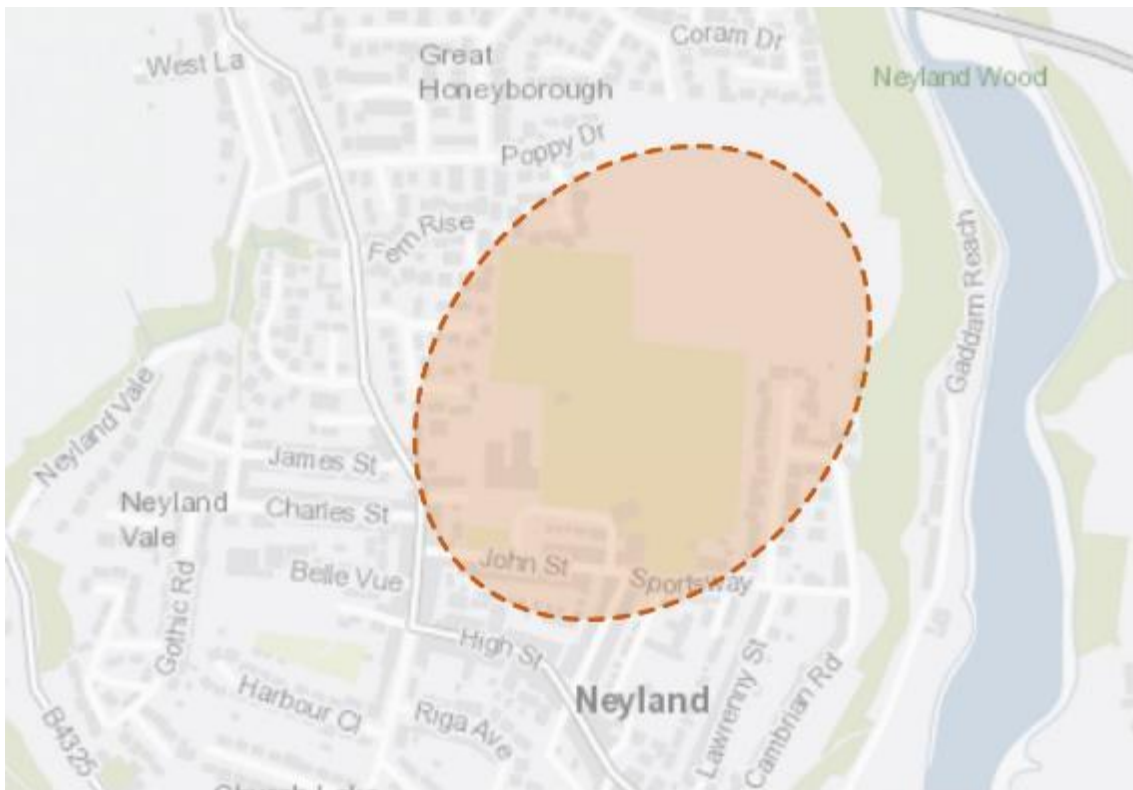


NEY16 – Introduce tree planting and street greening at Neyland Community School

7.35 Neyland Community School and Neyland Community Hub / Athletic Ground are located broadly centrally within the settlement and form the largest areas of greenspace within the urban context. Neyland has a notably lower percentage canopy cover when compared to other settlements in Pembrokeshire, at around 9.7%. Tree planting opportunities, particularly around field margins, would provide flood alleviation benefits and help create a wildlife corridor connecting the site to the ancient woodlands located to the east. The intervention would also aim to deliver wider connections to Westfield Pill Nature Reserve, enhancing ecological diversity.

7.36 The project provides the opportunity for a range of educational benefits that could be linked to the curriculum and provide practical opportunities for student engagement. Tree planting could also potentially include the development of a wider Forest School concept with the intention of developing connections with the natural world.

Figure 7.9: FIS8



Benefits of the project

7.37 Benefits of the project, as depicted in Figure 7.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion
- Reinforces a sense of place
- Urban cooling

- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 7.10: Benefits



Delivery mechanisms

7.38 Neyland Community School should be supported to deliver and lead the project, possibly in collaboration with Neyland Town Council. If possible, it may be beneficial to engage a Forest School professional to support the delivery of school sessions and help maximise impact with regard to wider environmental education.

7.39 An annual planting programme should be established to successfully plan, deliver and manage the new tree planting over the 60 month establishment period. Sufficient planning is required prior to the bare-root planting season (October-March at the latest) to ensure ground checks / soil testing is completed.

7.40 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Neyland Community School
- Neyland Town Council
- Neyland Community Hub
- Local community
- Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team
- Tree Wardens Pembrokeshire

Outline cost

Low cost = <£250k

7.41 The cost would likely be low but dependent on capacity within the school to manage the project. Opportunities should be sought to identify 'free tree giveaways' to schools which often run between November and March (e.g. Woodland Trust and Tree Council).

Potential funding opportunities

- Woodland Trust ('free tree giveaways')
- PCC
- National Lottery Community Fund
- Local Places for Nature Fund
- The Tree Council

Timescale

Quick win = <1 year

7.42 To provide an opportunity to engage the maximum number of students, it would likely be beneficial to extend planting works over several seasons. Some initial planting could be undertaken within the first year.

Medium-term = 1-5 years

7.43 Tree planting, maintenance and monitoring would need to extend over the 60 month establishment period.

Potential constraints

7.44 Planting locations would need to consider the existing function of the site, including sports and playing field use.

7.45 Safety, security and the maintenance of sight lines into and out of the site would also need to be considered.

Maintenance and stewardship

7.46 Establishment and maintenance should be informed by the delivery section of the Urban Tree Planting Strategy. Ongoing maintenance should incorporate input from students, providing practical involvement with ongoing learning opportunities. Engagement with community groups or a contractor may be required to ensure watering continues throughout school holidays, especially during summer months for the 60 month establishment period.

Monitoring for success

7.47 Measures for success would include the quantity of trees planted and the number of students and community groups engaged.

7.48 The establishment of a new or enhanced Forest School offer could form a long term aspiration.

Next steps

7.49 Initial engagement with Neyland Community School should involve the development of a project plan, outline programme and opportunities to link with the curriculum. A project lead within the school who is able to oversee the practical work should also be identified.

7.50 Consideration should be given to the most appropriate species mix, informed by the delivery section of the Urban Tree Planting Strategy. The selection of native species would likely be a priority in order to strengthen and improve ecological connectivity to existing woodland tracts.

Project Long List

NEY1 - Enhance the greening of Brunel Quay

7.51 Space should be reclaimed from the car park for additional green space and include trees, raised planters, cycle parking, electric bicycle charging stations and electric bike hire. The re-designed space should incorporate specimen tree planting, estuarial planting, seating areas, heritage interpretation, natural play equipment, areas of relaxed meadow management and enhanced wayfinding with the Brunel Trail. Trees should be planted around the edge of the green space to provide areas of shade. Plug plants, including the Tenby

daffodil, should be planted under the canopy of trees to create additional food sources for pollinators.

NEY2 - Improve access from the waterfront to Westfield Pill

7.52 Following the alignment of the former railway tracks, the access through the quayside industrial units should be clarified, surface markings provided and interpretation introduced to direct people through the space. Forming a section of the wider Brunel Trail, the opportunity exists to create a coherent route from Brunel Quay. Additional access routes along Station Road could also be explored. Modifications to the mowing regime and the sowing of wildflower meadow should be implemented along this route to provide enhanced aesthetic and biodiversity value.

NEY3 - Enhance Harbour Close Park

7.53 Enhance wayfinding and entrances to Harbour Close Park from Victoria Close, Belle Vue Street and Church Way by opening up sightlines and removing unwelcoming boundary treatments. Enhance play provision within the site by providing natural play trails and education boards coupled with habitat enhancements and insect hotels. Consideration should also be given to how seating areas cater for teenage girls, an often forgotten demographic. Hedgerows, edible hedges and wildflowers should be introduced along the park's boundary.

NEY4 - Utilise nature-based solutions to address water quality issues

7.54 Refer to Kickstarter Projects.

NEY5 - Introduce tree planting at Neyland Community Hub and Athletic Ground

7.55 Consider re-planting the four raised planters at the entrance to the Neyland Community Hub. These should be planted with native trees and complemented with further tree planting within the grass verge to the rear. Additional tree planting should also be introduced along the boundaries of the sports pitches to expand and enhance the existing hedgerow network.

NEY6 - Improve access to the council owned green space to the rear of the Athletic Ground

7.56 Currently, access to the Pembrokeshire County Council (PCC) owned land to the rear of the Athletics Ground is restricted. Consideration should be given to enhancing the access and signage from the Neyland Community Hub and from the existing LOCAL Development Plan (LDP) allocation to the north to provide valuable recreational space for surrounding communities. The introduction of fruit trees and the relaxation of the mowing regime would provide additional enhancements for biodiversity. The scheme should include reference to the proposed shared-user path connecting Poppy Drive with Sportsway.

NEY7 - Create a pollinator pathway along the Brunel Trail

7.57 Plug plants should be introduced along the verges of this route linking Neyland to Haverfordwest, ensuring a mowing strip is maintained parallel the path edge. In wider open areas, wildflower meadows should be created. Fruit trees should also be planted along the route to create an edible corridor. Invasive species should be removed and eradicated where present. Proposals

should complement existing plans to remove barriers as a mechanism to improve access for all.

NEY8 - Enhance habitat and access at Neyland Vale Common

7.58 Glades and rides should be created in the woodland to encourage a diverse ground flora. Create an access route for exploration through the woodland. Wayfinding should be introduced to connect new residential development at Victoria Close with Neyland Vale. Vegetation around the perimeter of the pond is overgrown and detracts from the pond's value for biodiversity. As a consequence, mature trees and scrub should be cut back to increase light and encourage marginal aquatic vegetation to flourish. Invasive buddleia and Japanese knotweed should also be removed.

NEY9 - Expand the number of native flowerbeds

7.59 Plant pollinator friendly flower beds, borders and pots in sheltered sunny spots to provide food from early spring to winter. Planting blocks of the same type of flower saves time for pollinators as they can move from flower to flower more quickly. Use of harmful chemicals should be avoided. Suitable locations may be the seating areas by Windsor Gardens, The Promenade and at Brunel Quay. This would provide additional connectivity to the sleeper flower beds on Neyland Terrace and Railway Terrace.

NEY10 - Enhance the biodiversity value of Westfield Drive green space

7.60 Extend the hedgerow planting bordering the A477 and shared-user path with scrub and native tree planting to provide additional structural complexity, shelter, food, and nesting sites. Wildflower strips should also be introduced around the edges to provide nectar for pollinators.

NEY11 - Introduce wildflower meadows and trees at Honeyborough Green

7.61 Honeyborough Green is designated common land and could be enhanced further through additional tree planting. Provision should be made for future tree succession, including planning for replacements due to ash dieback (*Hymenoscyphus fraxineus*). These interventions would provide additional areas of cooling and shading in the summer months. Areas of the green could also be planted with wildflowers to provide connected pollinator habitats and enhance the appearance of the greenspace. Proposals should complement wider shared-user path proposals connecting the A477 with Neyland.

NEY12 - Create wildflower verges along The Promenade

7.62 Refer to Kickstarter Projects.

NEY13 - Enhance greening of the High Street

7.63 Introduce street trees at key nodes or through the reconfiguration of existing parking spaces along the High Street. Proposals should be developed

in conjunction with wider proposals to implement a shared-user path along the High Street. Local businesses and residents should also be encouraged to install window boxes with pollinator-friendly flowering plants where possible.

NEY14 - Promote the greening of Riverside Avenue

7.64 The opportunity exists to incorporate tree planting within the existing central reservation on Riverside Avenue (services permitting). Native species should be selected where possible. Trees should also be planted and the mowing regime relaxed at the grass verges at Riverside Avenue and Harbour Close.

NEY15 - Provide access and biodiversity enhancements to the Cambrian Road green space

7.65 Excellent views of the estuary are afforded from Cambrian Road. However, pedestrian access is currently limited and restricted by the steep gradient of the greenspace. Steps and a gently sloping boardwalk could be added in this location to provide access from Neyland Marina to the town centre. The mowing regime of the steep slopes should be relaxed and sown with wildflowers to create an attractive meadow. Additional tree planting could also be considered, whilst ensuring the retention of long range views.

NEY16 - Introduce tree planting and street greening at Neyland Community School

7.66 Refer to Kickstarter Projects.

NEY17 - Extend Westfield Pill Nature Reserve

7.67 Westfield Pill Nature Reserve lies within Flood Zone 3, located adjacent Westfield Pill watercourse and lake which feed into the Milford Haven Estuary. Extension of this site, particularly along the agricultural eastern margins, would act as floodplain storage providing protection from tidal surges whilst enhancing the ecological diversity of the area..

Chapter 8

Pembroke

Figure 8.1: Pembroke



A Portrait of Pembroke's Green Infrastructure

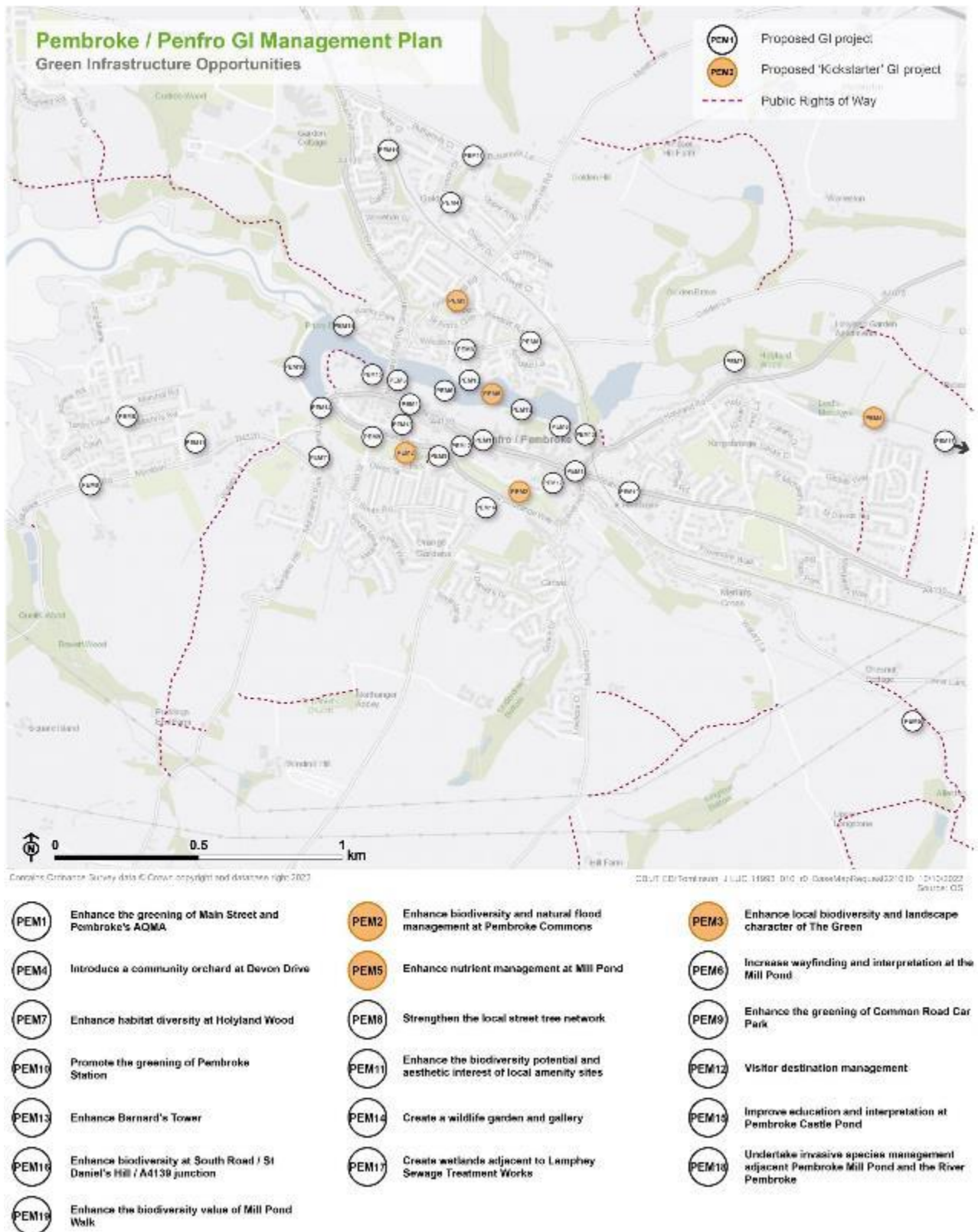
8.1 The ancient town of Pembroke retains a largely historic character within its densely settled core. Situated on a spit of land protruding into the Pembroke

River and the Mill Pond, the old town centre is delineated by medieval wall foundations, associated with Pembroke Castle which is designated as a Scheduled Monument and a Grade I Listed building. Along Main Street leading to the castle are numerous listed buildings, contributing to the overall historic character.

8.2 Partially as a result of Pembroke's heritage status, the town is well connected to the wider region. In addition to a railway station, there are a number of recreational walking and cycling paths that radiate from the town centre. Walking and cycling paths along the Pembroke River retain excellent views of the castle and historic town centre, making them popular with tourists. A National Trail, the Pembrokeshire Coast Path, follows the banks of the Pembroke River and along the western edge of town. National Cycle Network (NCN) 4 also passes through the town centre. However, some areas of the town, including the southern and north-eastern neighbourhoods, do lack access to the Public Rights of Way (PRoW) network, particularly where the railway line acts as a severing feature to movement.

8.3 Open spaces within the town are numerous and largely consist of recreation grounds or amenity green spaces. Upper Common and Lower Common are linear public parks just south of the town centre and are also well connected to the network of recreational routes. Multiple smaller open spaces are situated to the east and west of these parks and create opportunities for the further movement of wildlife.

Figure 8.2: GI Opportunities within Pembroke



Kickstarter Projects

PEM2 – Enhance biodiversity and natural flood management at Pembroke Commons

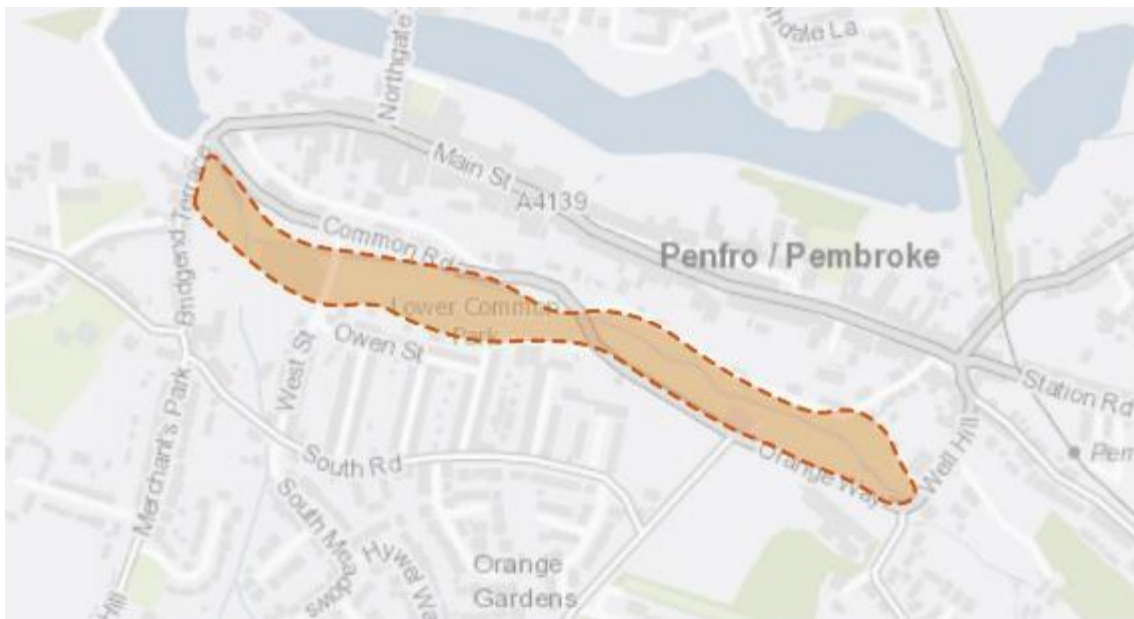
8.4 Land at Upper and Lower Commons is characterised by a linear open space approximately 850m in length, defined predominantly by multifunctional green space bisected by a brook. As the site lies within a flood zone, the opportunity exists to reconfigure some sections of the river channel within the Upper Commons to create wetland scrapes and flood retention areas. Scrapes support a diversity of aquatic wildlife, particularly wetland plants and insects such as water beetles, dragonflies and pollinating hoverflies. Consideration should also be given to the introduction of shrub understorey to enhance biodiversity, whilst ensuring the retention of sight lines. Continued clearance of hemlock (*Conium maculatum*) is also required along the river to promote the establishment of aquatic flora and allow water to flow efficiently during flood events.

8.5 Local Places for Nature funding has previously supported the establishment of wildflower meadows in the Upper and Lower Commons. These habitats have significantly enhanced the margins and paths through the green space. The extension of this intervention to create wet meadows in the Lower Commons would help create a large area of continuous pollinator habitat and help retain water on site.

8.6 A community orchard should also be created within the southern edge of the Lower Commons, set within species rich grassland. Eating, cooking and crab apple blossom between late April and May provides a much-needed early foraging source for honeybees, bumblebees, solitary bees and hoverflies. Later in the year, butterflies (including red admirals and painted ladies) would feed on the juices of fallen, over-ripe fruit. Apples are usually grafted onto a rootstock which determines how tall they grow and how quickly they come into fruit. Growing local varieties can also help local businesses promote their products.

8.7 To improve access and visual appeal, perimeter railings should be repainted, and dilapidated bridges restored or replaced. Proposed works should complement proposals to upgrade the existing network of footways to shared-user paths as part of Safe Routes in Communities funding.

Figure 8.3: PEM2



Benefits of the project

8.8 Benefits of the project, as depicted in Figure 8.4 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion

- Reinforces a sense of place
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 8.4: Benefits



Delivery mechanisms

8.9 Wildflower meadows and the community orchard should be delivered in accordance with the Pollinator Strategy Delivery section.

8.10 Where feasible, delivery should be integrated into the work programme of the Pembrokeshire County Council (PCC) Amenity Maintenance Team. Contractors and / or additional machinery may be required to create the wetland scrapes and flood retention areas, as well as replacing the dilapidated bridges.

8.11 In order to avoid the growth of vigorous grasses, there may be a requirement to reduce soil fertility by stripping away the top 5-10 cm of soil in the area where the wet meadow is created. Autumn is the best time to sow wildflower seeds to have the earliest display of wildflowers the following year. However, wildflower seeds can be planted throughout the year and begin to bloom after approximately 60-80 days.

Potential partners

- Pembroke Town Council
- Pembrokeshire Local Nature Partnership
- Local businesses
- Pembroke 21C Community Interest Company

Outline cost

Low cost = <£250k

8.12 The cost of painting the railings and the new bridge crossings have previously been estimated as £45k. Cost of wildflower seed is likely to be low, although this would be higher if plug plants or wildflower turf are used.

Potential funding opportunities

- Local Places for Nature Fund;
- National Lottery Community Fund; and
- Safe Routes in Communities Grant

Timescale

Medium-term = (1-5 years)

8.13 Depending on soil fertility and if wildflowers are sown after Autumn, it may be the case that the seeds do not bloom until after their first winter season. Likewise, it may take a number of years for apple trees to mature and bear fruit

as this would be dependent on which variety of apple tree is planted, soil conditions and the size of stock.

Potential constraints

8.14 The establishment of marginal aquatic vegetation and creation of flood retention areas would be important to the success of the meadow as otherwise nutrient enrichment during flood events may prevent the meadow from establishing.

8.15 Community or local business buy-in may be required to ensure long-term management of the orchards. Agreements may need to be reached on health and safety responsibilities and beneficiaries of resulting fruit. There is also a risk that the fruit trees may also be damaged from antisocial behaviour.

8.16 Hemlock is a poisonous plant. Cutting or mowing hemlock plants can cause resprouting and the emission of toxic fumes if they've already matured. The entire taproot needs to be removed to prevent the plant from regrowing.

Maintenance and stewardship

8.17 The detention / retention area may require basic mowing, vegetation management and general maintenance. In addition, erosion repair may be needed after a flood event. Overhanging or overgrown vegetation along the stream would also need to be routinely cleared. Mowing of areas of wet meadow would be required at the end of the flowering season, with arisings left in place for seven days to allow seeds to drop.

8.18 The local community should be engaged to act as stewards of the orchard. Maintenance pruning would be necessary to maintain the balance between fruit production and vegetative growth.

8.19 Management would be required to prevent weeds from competing with newly planted trees and meadow for water and nutrients.

8.20 Works on the brook should be scheduled during the late autumn and winter when the majority of aquatic fauna is overwintering and / or is less active through the water column.

Monitoring for success

8.21 If successful, the project should deliver a well-managed traditional orchard with a range of healthy young and old trees. This includes established wetland-grassland mosaic abundant with invertebrates, birds and wildflowers. Species richness surveys should be conducted to monitor success.

Next steps

8.22 Review the Delivery section of the Pollinator Strategy to determine the process and review case studies of creating wildflower meadows and community orchards. Review the Delivery section of the Urban Tree Planting Strategy to understand the key components for successful tree establishment.

8.23 Engage council members, residents and community groups to establish who would have overall responsibility for the orchard in the Lower Commons.

Figure 8.5: Pembroke



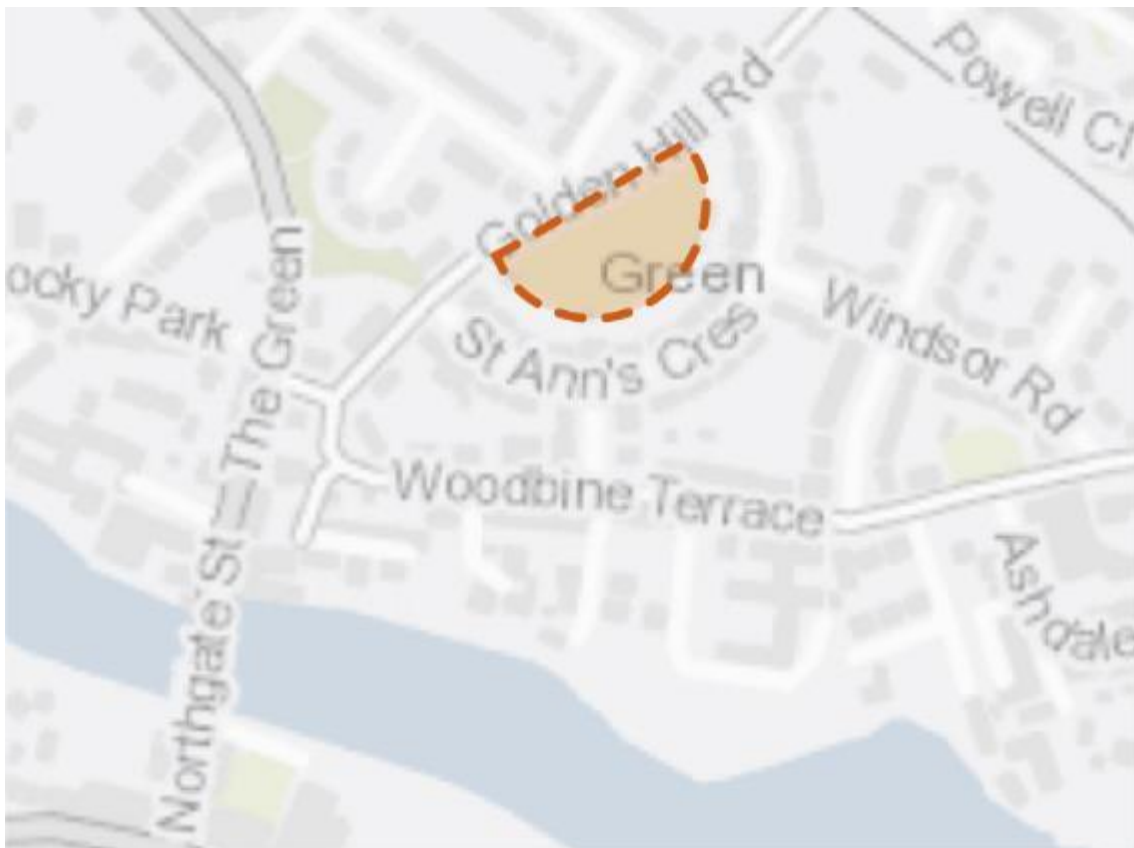
PEM3 – Enhance local biodiversity and landscape character of The Green

8.24 The Green forms a crescent-shaped piece of amenity greenspace bounded by the back gardens of St Ann’s Crescent and Golden Hill Road. At present, the space is characterised by a large swathe of short mown grass with metal play equipment, some of which is looking tired. The interface between back gardens and The Green is dominated by overgrown shrubs, brambles and bare breeze block walls. A number of tree stumps exist within this boundary, providing an important habitat feature for invertebrates. Some existing bulb planting, including daffodils, are also present along the boundary. Although there are no active residential frontages onto the space, The Green enjoys a

relative degree of natural surveillance from nearby second floor windows and the Golden Hill Road, which is also a bus route.

8.25 This project should work with local residents to co-create a new space which is welcoming and accessible for all. This could incorporate a range of tree planting such as orchards, specimen trees, small copses and some boundary trees along the road (ensuring natural surveillance from the road and surrounding houses is maintained). Dilapidated play equipment should be replaced with natural play, including climbing boulders, stepping stones and balancing logs. Sociable swing sets, performance spaces, climbing bars and informal seating could be installed to create a more welcoming space for often forgotten demographics, such as teenage girls. The addition of wildflower swathes around the space's boundaries would reduce the risk of trampling, whilst also creating quieter areas for people to sit, enjoy and interact with nature, as well as provide for additional habitat features such as log piles and bug hotels.

Figure 8.6: PEM3



Benefits of the project

8.26 Benefits of the project, as depicted in Figure 8.7 below, include:

- Reduces the risk of flooding
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 8.7: Benefits



Delivery mechanisms

8.27 It is essential that the design and delivery of this project is done in collaboration with the community to ensure the longevity and stewardship of the space.

8.28 Wildflower meadows significantly reduce resource inputs during the growing season. However, annual cuts of the meadow should be integrated into the work programme of the Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team.

8.29 Provision of pollinator habitat should be delivered in accordance with the delivery section of the Pollinator Strategy.

8.30 The delivery of successful tree planting schemes can be challenging and costly due to the time it takes for trees to reach maturity and the cost of purchasing established stock. The design of tree pits, the depth and soil used and the on-going watering and maintenance is vital in ensuring successful establishment and should therefore be carried out in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- Local residents
- Tree Wardens Pembrokeshire
- Pembrokeshire Nature Partnership
- Pembroke Town Council

Outline cost

Low cost = <£250k

8.31 Cost of wildflower seeds would be lower, however, this would increase if plug plants or wildflower turf is chosen to create a more instant impact. The price of new trees would depend on the size they are purchased and the species. The largest capital investment for this project would involve the implementation of new play equipment. The delivery of fewer bespoke, hard wearing and attractive pieces should be prioritised over the delivery of a greater number of cheaper pieces of equipment.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund

Timescale

Medium-term = 1-5 years

8.32 Depending on soil fertility and if wildflowers are sown after Autumn it may be the case that the seeds do not bloom until after their first winter season. Likewise, it may take a number of years for fruit trees to mature and bear fruit, depending on which variety of tree has been planted, soil conditions and whether seedlings or standards are planted.

8.33 Given the various aspects to the project and the need for extensive community engagement, the work may be staggered over a number of years.

Potential constraints

8.34 Community engagement and buy-in to the proposals would be needed for the long-term stewardship of the site.

8.35 Community or local business buy-in may be required to ensure long-term management of any orchard trees. Agreements may need to be reached on health and safety responsibilities and beneficiaries of resulting fruit. There's a risk the fruit trees may also be damaged from antisocial behaviour.

Maintenance and stewardship

8.36 The space could be a largely community-managed asset with some input from the PCC StreetCare / Amenity Maintenance Team when machinery or horticultural input is required. Community stewardship is particularly important throughout the initial establishment years (60 months) to ensure trees are sufficiently watered during dry periods and stakes loosened when required.

8.37 The local community should be engaged to act as stewards of the orchard. Maintenance pruning would be necessary to maintain the balance between fruit production and vegetative growth.

8.38 Management would be required to prevent weeds from competing with newly planted trees and meadow plants for water and nutrients.

Monitoring for success

8.39 The survival rate of new planting and areas of meadow habitats established can be monitoring indicators for success. An annual community BioBlitz could be organised to record the variety of life within areas of the meadow, vegetation establishment and other habitat features. Engaging with citizen science projects such as the UK Pollinator Monitoring Scheme or organising an annual community BioBlitz at certain greenspaces can help involve local communities in monitoring efforts. This could also be done in partnership with local schools.

Next steps

8.40 Consult with PCC StreetCare / Amenity Maintenance Team;

8.41 Consult with local residents to determine what they want to achieve from the space and ensure a process of co-creation is adopted; and

8.42 Review the delivery sections of the Pollinator Strategy and Urban Tree Planting Strategy to review options for enhancing the biodiversity value of greenspaces.

Figure 8.8: Pembroke



PEM5 – Enhance nutrient management at Mill Pond

8.43 Nutrient run-off and sediment build-up into the Mill Pond has resulted in issues with algal growth. Significant areas of agricultural land in the catchment of the Pembroke River (which feeds the pond) is used for arable crop production, with periods of bare ploughed soil each year, and the associated applications of fertilizer. The immediate urban catchment of Pembroke may also contribute nutrients and sediment via stormwater discharge, with Dwr Cymru Welsh Water reporting five Combined Storm Overflows (CSOs) discharging around the Mill Pond area. The Dwr Cymru Welsh Water sewage works at Lamphey also discharges into the Pembroke River.

8.44 Tackling this issue should be on two twin tracks

Nature-based solutions

8.45 These should be utilised to tackle underlying agricultural causes. Previous projects have identified that there are areas of land where there are opportunities to implement changes to land management that would benefit water quality, reduce flood risk and decrease the risk of siltation of the River Pembroke and hence the Mill Pond. The entire catchment of the Mill Pond should be targeted for interventions, with a particular initial focus on the Pembrokeshire County Council (PCC) owned farms to the east of Pembroke, including between Lamphey and Alleston Wood.

8.46 A process of opportunity mapping using remote-sensing data has already been undertaken, and this has identified areas where changes in land management could deliver benefit. An initial data-gathering stage across the catchment of Pembroke River and the Mill Pond would provide local-scale ground-truthing of these opportunities, and identify areas where interventions could deliver benefit. This data-gathering and opportunity mapping stage could then swiftly be carried through to the delivery of a range of land-use change and interventions, which may include;

- Creating riparian buffer strips, reducing grazing in proximity to watercourses;
- Formalising areas of livestock watering, so enabling the erection of fences along the watercourse to protect from bank erosion, bank poaching and manure impact;
- Planting of field margins and shelter belts with trees / shrubs to increase water retention within tree and shrub planting;
- Creating natural dams within small watercourses, slowing flow and increasing diversity of habitats within the landscape; and
- Implementing a management plan for areas of reedbed at Mill Pond.

Urban run-off and foul sewage input

8.47 The second aspect to the project is to work with Dwr Cymru Welsh Water to investigate the degree to which stormwater, CSOs and the Lamphey sewage works contribute to nutrient enrichment in Mill Pond and deliver infrastructure improvement works to ameliorate this impact.

Figure 8.9: PEM5



Benefits of the project

8.48 Benefits of the project, as depicted in Figure 8.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Carbon sequestration & climate mitigation

Figure 8.10: Benefits



Delivery of nature-based solutions and ecosystem services

8.49 Land use management since the Second World War has involved increased drainage of the land, in a drive to maximise the efficiency of farmland. This has led to a reduction in diversity of habitats, and the loss of wetlands, wet-grassland and associated wet terrestrial habitats. It has also increased flood risk, as it increases the speed and volume of water flow down catchments, reducing the buffering effect of the landscape during heavy and prolonged rainfall events. Increased drainage of wet soils also has a detrimental effect on the ability of soil to sequester carbon.

8.50 Through the use of techniques such as riparian buffer strips, reducing bank erosion and poaching, planting of shelter belts and field margins and the creation of natural dams within small watercourses, the ability of the landscape to absorb and buffer rainfall can be significantly increased. This would have a concomitant beneficial impact on flood risk, on water quality and on carbon sequestration, as re-wetting of wetland soils would increase their capacity to absorb and lock-in carbon.

8.51 The impact of nutrient enrichment from CSOs and sewage treatment plant outfalls is detrimental to habitats and species, and in extreme instances can lead to the death of the ecosystem. Addressing this impact would therefore

have a beneficial impact on biodiversity, ecosystem resilience and on the ability of the ecosystem to act as a net sink for carbon.

Delivery mechanisms

Nature-based solutions

8.52 Initially, it is proposed that the project would be targeted on a local, site-specific level by undertaking a survey to ground-truth the presence and scale of opportunity areas that have been identified to date using remote-sensing techniques. This survey should be undertaken by suitably trained citizen scientists, Pembrokeshire County Council (PCC) staff or an external specialist consultant. Once areas of key opportunity have been ground-truthed and defined, it would be necessary to engage with landowners and land occupiers / graziers in order to present these opportunities and discuss their impacts on current land-use. This may lead to the loss of some opportunities for reasons of commercial and physical agricultural constraints.

8.53 The proposed physical interventions and amendments to land management should be delivered by the landowners themselves, or by external agricultural contractors.

Urban run-off and foul sewage input

8.54 Delivery of improvements on this aspect would require co-operation and involvement of Dwr Cymru Welsh Water. A strategic partnership between PCC and Dwr Cymru Welsh Water to investigate, assess and improve the situation in the catchment is required.

Potential partners

- Dwr Cymru Welsh Water

- Wildlife Trust of South and West Wales
- Natural Resources Wales (NRW)
- PCC
- West Wales Rivers Trust
- Pembroke Town Council

Outline cost

Nature-based solutions

Low cost = <£250k

8.55 It is envisaged that this project may cost tens of thousands of pounds or less, dependent upon the area of catchment targeted for interventions. Costs would comprise some limited specialist advice and land agent fees, fencing, tree planting costs and possibly costs associated with installation of alternative livestock watering apparatus.

Urban run-off and foul sewage input

Low cost = <£250k

8.56 Initial investigation and feasibility study.

Medium to high cost = <£250k- £1 million+

8.57 Delivery of interventions is anticipated to be medium to high in costs, alongside associated upgrades to infrastructure.

Potential funding opportunities

- Emerging Welsh Government Sustainable Farming Scheme
- National Forest for Wales – The Woodland Investment Grant (National Lottery Heritage Fund – Round 1)
- Dwr Cymru Welsh Water Asset Management Plan (AMP) budget for strategic upgrades

Timescale

Nature-based solutions

Quick win = <1 year

8.58 Physical interventions could be delivered within a single year. However, a key unknown for the project would be the time taken to gain landowner / occupier / grazier agreements / consents.

Urban run-off and foul sewage input

Quick win = <1 year

8.59 Initial investigation and feasibility study.

Medium-term = 1-5 years

8.60 Delivery of interventions is anticipated to be in the medium-term, alongside associated upgrades to infrastructure.

Potential constraints

Nature-based solutions

8.61 A key constraint for the project would be securing landowner / occupier / grazier agreements, as there may be a perceived risk to farm viability associated with some loss of land to riparian margins / shelter belts / field margin planting etc. There may also be resistance to alteration of watercourses with respect to land drainage concerns. Concerns should be countered with the availability of agricultural payments for environmental goods and services, and hence the delayed launch of the Welsh Government's Sustainable Farming Scheme is a potential constraint in this regard.

Urban run-off and foul sewage input

8.62 A critical constraint to the undertaking of an assessment and feasibility project would be the willingness and co-operation of Dwr Cymru Welsh Water. The delivery of interventions to improve any identified CSO and sewage effluent issues would potentially be constrained by the availability of AMP funding through Dwr Cymru Welsh Water for upgrades, and the prioritisation of this catchment.

Maintenance and stewardship

8.63 Maintenance of the softworks would be required as part of the 60 month establishment phase, including the replacement of failed trees. If fencing is installed to keep livestock out of watercourses, there would also be a limited ongoing maintenance associated with the maintenance of this fencing.

8.64 Maintenance and asset stewardship for any infrastructure upgrades would fall under the statutory remit of Dwr Cymru Welsh Water.

Monitoring for success

8.65 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science, with suitable support. Techniques could include monitoring of water quality using simple hand-held equipment, or installation of a simple stream-gauge to monitor streamflow, for example.

8.66 Monitoring of CSOs and Dwr Cymru Welsh Water performance in this regard should also be undertaken using citizen science.

8.67 Technical monitoring and asset stewardship for any infrastructure upgrades fall under the statutory remit of Dwr Cymru Welsh Water.

Next steps

8.68 Secure limited funding (£1k to £10k) to ground truth remote sensing across the catchment, creating a priority list of areas for intervention.

8.69 Engage with landowners / occupiers / graziers and enter into agreements to deliver interventions on their land.

8.70 Engage with Dwr Cymru Welsh Water to ascertain appetite and budget to progress with the assessment and feasibility study.

Figure 8.11: Pembroke



Project Long List

PEM1 - Enhance the greening of Main Street and Pembroke's AQMA

8.71 Greening measures should be introduced along Main Street to help mitigate the issue of poor air quality. The narrow urban canyon of Main Street, coupled with the constraint of its use for events and proposed shared-user path, dictates that tree planting is only suitable in limited areas. Incorporate small, fastigate specimens along the section of the route stretching from Northgate

Street towards Brown's Cafe. The re-purposing of some parking spaces to provide parklets could provide additional seating and spill out space, as well as excellent particulate capture. Elsewhere, raised planters, window boxes and hanging baskets should be installed.

PEM2 - Enhance biodiversity and natural flood management at Pembroke Commons

8.72 Refer to Kickstarter Projects.

PEM3 - Enhance local biodiversity and landscape character of The Green

8.73 Refer to Kickstarter Projects.

PEM4 - Introduce a community orchard at Devon Drive

8.74 Working in collaboration with the local residents to encourage community ownership, establish a community orchard within areas of existing amenity grass along Devon Drive. The proposals should include the sowing of wildflower meadow and adoption of relaxed mowing regimes to create wildflower meadows with mown paths and informal seating in glades

PEM5 - Enhance nutrient management at Mill Pond

8.75 Refer to Kickstarter Projects.

PEM6 - Increase wayfinding and interpretation at the Mill Pond

8.76 Enhance links from the town centre to the Mill Pond to encourage local residents and visitors to enjoy the Local Nature Reserve and the opportunities it offers to observe wildlife. Signage and wayfinding should be installed to enhance the perimeter route, including at Blackhorse Lane leading towards Barnard's Tower. Consideration should be given to the establishment of regular events at Mill Pond Walk, including a monthly food market. The potential to integrate greening initiatives along the proposed shared-user path ordering the Mill Pond and connecting Barnard's Tower with Mill Bridge should be explored. Urban greening interventions should also be incorporated on pedestrian linkages leading to and from Main Street.

PEM7 - Enhance habitat diversity at Holyland Wood

8.77 The structural diversity of the woodland and mosaic of wetland and grassland habitats should be enhanced. This should include coppicing areas of dense canopy to encourage the establishment of ground flora and retention of dead wood. Natural regeneration of trees should be promoted but additional tree planting could occur along the woodland edge to act as an interface between mature woodland and scrub. Removal of Himalayan Balsam and Japanese Knotweed should continue. Fencing around boardwalks should be installed to stop disturbance from dog walkers.

PEM8 - Strengthen the local street tree network

8.78 Explore opportunities to introduce additional street tree planting within areas of wide pavement and incidental grass areas / grass verges. This would address the gaps in strategic canopy cover, whilst also softening urban edges. Potential locations include Angle Rd, Long Mains, Golden Lane and Woodbine

Terrace. The management of existing street trees should also be re-examined, ensuring tree stakes, grilles and guards are removed or loosened to accommodate growth.

PEM9 - Enhance the greening of Common Road Car Park

8.79 The opportunity exists to soften the largely hard-surfaced Common Road Car Park. Consideration should be given to the minor reconfiguration of some parking bays to allow the integration of street trees and urban greening solutions. Raised planters around bus stops and on redundant hard surfacing, alongside secure green cycle parking could also be introduced. These interventions would not only create a more welcoming gateway to Pembroke for visitors, but also reduce surface water run-off from the road towards adjacent watercourses.

PEM10 - Promote the greening of Pembroke Station

8.80 Consider the introduction of tree planting and raised planters to create a sense of arrival and soften hard landscapes / boundaries at the car park area adjacent to the station. The opportunity exists to integrate these features into proposed active travel connections which are currently in development. Secure cycle parking, seating provision and electric bicycle charging stations should also be explored to encourage the uptake of active travel.

PEM11 - Enhance the biodiversity potential and aesthetic interest of local amenity sites

8.81 Pembroke hosts a number of amenity greenspaces which are dominated by large swathes of close mown grass and little or no existing tree cover.

Opportunities to introduce tree planting to provide shade, character and biodiversity should be explored, whilst also retaining recreation functions. Examples of potential sites include land at Back Terrace / Monkton, south end of Bridgend Terrace, Golden Hill Road / Elm Grove, Devon Drive, Gatehouse View and Buttermilk Drive.

PEM12 - Visitor destination management

8.82 Create a new entrance feature at Banker Walk to provide a direct link into the town centre from the Commons Car Park, maximising footfall. The existing access should be subject to regrading works to create a more accessible gradient and urban greening interventions introduced. A green wall and habitat management to clear invasive buddleia and encourage the establishment of native wildflowers would create an inviting entrance to the town. Consideration should also be given to the installation of improved wayfinding and 'Welcome to Pembroke' signage.

PEM13 - Enhance Barnard's Tower

8.83 Barnard's Tower is home to a colony of bats, including greater horseshoes. Interpretation measures, incorporating a live stream feed and signage, would help provide community education on the importance of these species and the role of woodland belts and river corridors as foraging and community routes. An amphitheatre should be created to provide an outdoor events space. In the setting of the Tower, wildflower meadow and trees should also be established to continue connectivity with Mill Pond Walk.

PEM14 - Create a wildlife garden and gallery

8.84 Develop a business plan for the Turner's Reach Gallery and incorporate a native wildlife garden. Butterfly, bee and moth nectar borders, native tree, shrub and hedge planting and nest boxes and feeding stations for birds would provide

connectivity with existing planting along the Commons and the Mill Pond. The gallery would support local artists and provide an additional tourist attraction.

PEM15 - Improve education and interpretation at Pembroke Castle Pond

8.85 Create an environmental visitor centre where live stream videos of bat colonies at Barnard’s Tower, the otter pass at the Mill Pond and wildlife along the estuary corridor can be shown to raise awareness of Pembroke’s important biodiversity assets. Improvements to local footpaths, including a proposed shared user path on Westfield Hill, and perimeter railings around Castle Pond should also be considered. The estuarine atmosphere could be enhanced through the planting of additional areas of wildflower meadow and bulb planting.

PEM16 - Enhance biodiversity at South Road / St Daniel's Hill / A4139 junction

8.86 Plant additional large parkland tree species on the sloping green space at this junction, providing biodiversity opportunities and strengthening landscape character at this town centre gateway. Consider small scale landform modifications to reduce surface water runoff and create small seasonally wet areas habitat niches.

PEM17 - Create wetlands adjacent to Lamphey Sewage Treatment Works

8.87 High nutrient content and signs of eutrophication are evident at Pembroke Mill Pond. Conversion of vacant land adjacent to the sewage treatments works to the west of the town could act as a buffer for sewage outfall in periods of high volume. Wetland habitat would create new habitat for wildlife and aid nutrient stripping of the outfall, helping to alleviate the nutrient load which is currently

discharged into the watercourse (and subsequently Pembroke Marine SAC located further downstream).

PEM18 - Undertake invasive species management adjacent Pembroke Mill Pond and the River Pembroke

8.88 Create a management plan which promotes positive management practices, including control of Common Reed (*Phragmites australis*) / Bulrush (*Typha latifolia*) and the implementation of a strategy to reduce invasive species adjacent Pembroke Mill Pond and the River Pembroke. In addition to the waterside environment, ecological surveys should be conducted to determine the existing species composition of adjacent woodland to encourage the preservation and enhancement of a rich understorey flora.

PEM19 - Enhance the biodiversity value of Mill Pond Walk

8.89 Introduce proposals to enhance biodiversity at the foot of the burgage walls / north walls along Mill Pond Walk. Proposals should be developed in conjunction with Cadw, Pembrokeshire County Council (PCC) and the Pembroke Town Walls Trust in recognition of the heritage constraints of the site and the historic medieval town walls. The opportunity exists to introduce locally appropriate ground flora and bulb planting to enhance pollinator and visitor interest.

Chapter 9

Pembroke Dock

Figure 9.1: Pembroke Dock



A Portrait of Pembroke Dock's Green Infrastructure

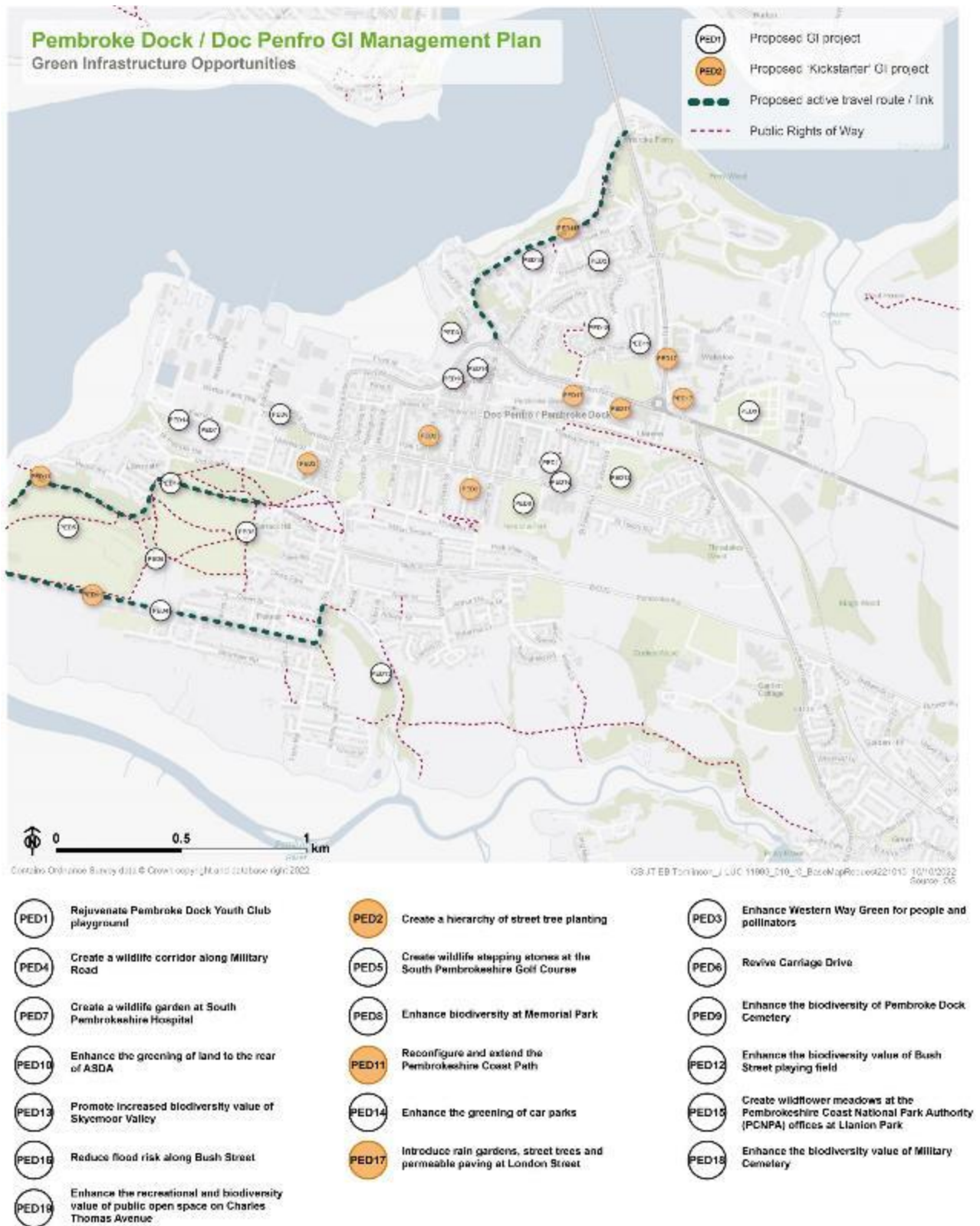
9.1 Pembroke Dock is a relatively large town of just under 10,000 inhabitants. Located on the southern banks of Milford Haven, the town is bounded by the

mouths of the River Cleddau to the north and the River Pembroke to the south. Originating as a fishing village, it transitioned into a town with a strong industrial and naval background, tied to its docks and the deep natural harbour of Milford Haven, a designated Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC).

9.2 The town has strong transport links to the wider landscape, with a railway, ferries, and multiple long distance recreational routes connecting to and passing through the town centre. The 186-mile Pembrokeshire Coast Path passes along the south-west edge of town and through the centre, connecting across the Cleddau Bridge further north. A National Cycle Network (NCN) route also passes north-south through the town centre, with various other recreational routes linking up and extending east into the wider landscape. A portion of the existing network of Public Rights of Ways (PRoWs) is concentrated within and adjacent to a large golf course at the town's south western edge, with multiple connections to the Pembrokeshire Coast Path and town centre. Other sections of footpath on the eastern side of the town are more disjointed, and there are opportunities to improve overall connectivity.

9.3 There is little open space along the estuarine coastline, which is generally built up as part of the docks and port, in addition to areas of dense residential settlement. However, larger open spaces are scattered throughout the town centre, and are linked via cycle and walking routes. Generally, play areas and recreational fields are concentrated in the east of the town, with smaller sections of footpath linking between them. Opportunities exist to enhance public spaces along the coastline, particularly north of the docks, which would enable greater community connections with the estuary and nature. Pembroke Dock's regular street grid reflects the settlement's history as a key Royal Navy shipyard and the use of the streets for military parades, the legacy of which has created a town distinctly lacking in trees and urban GI.

Figure 9.2: GI Opportunities within Pembroke Dock



Kickstarter Projects

PED2 – Create a hierarchy of street tree planting

9.4 Pembroke Dock's grid street pattern offers the opportunity to implement street tree planting to soften the existing public realm. The grid pattern is a defining characteristic of the Pembroke Dock Conservation Area and therefore new tree planting should reinforce the hierarchy of these streets. This would deliver a positive contribution to townscape character, ensuring heritage assets are celebrated rather than screened. Proposals should also avoid any detrimental impacts on heritage assets.

9.5 Working in conjunction with residents as well as the Historic Building Conservation Officer and Landscape Officer at Pembrokeshire County Council (PCC), locations for new street tree planting should be identified. Proposals should ensure that tree planting proposals enhance the setting of the distinctive historic grid pattern and do not result in detrimental impacts on heritage assets. A hierarchy of trees should be established, for example, principal tree lined streets (e.g. central reservation along Meyrick Street or verges on Devonshire Road), streets with trees incorporated within parking nodes (e.g. Laws Street) and streets with trees to frame views (e.g. Market Street). By working with residents to identify locations and preferred species selection, community ownership of the trees should be encouraged. Where space permits, incidental seating, raised planters and linear rain gardens could also be delivered to create community parklets. Furthermore, consideration should be given to the implementation of a tree replenishment programme to address the diminished tree stock in the town.

9.6 Pembroke Dock's Urban Tree Strategy must be cross-referenced when delivering this project. Proposals for tree planting must align with the future aspirations for integrated walking and cycling routes along Laws Street, Water

Street, Apley Terrace and Gwyther Street as part of the Integrated Network Maps (INMs) [See reference 2].

Figure 9.3: PED2



Benefits of the project

9.7 Benefits of the project, as depicted in Figure 9.4 below, include:

- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place

- Improves health and wellbeing

Figure 9.4: Benefits



Delivery mechanisms

9.8 An annual planting programme should be established for Pembroke Dock to successfully plan, deliver and manage new tree planting across the town. Proposals should be developed prior to the bare-root planting season (October-March at the latest) to ensure sufficient time for ground checks and the sourcing of nursery stock.

9.9 Residents should have the ability to put forward requests for tree planting locations and species. If the location is appropriate and funding available, the tree should be added to the annual planting programme.

9.10 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Residents
- PCC Highways and Transport Department

- Pembroke Dock Town Council
- Local businesses
- Peter Hall Community Trust
- Friends of Pembroke Dock Memorial Park
- Tree Wardens Pembrokeshire
- Pembroke Port

Outline cost

Medium to high cost = £250k – £1 million

9.11 The cost of the project is scalable depending on the number of trees planted. However, a rough estimate of ~£10,000 is required to appropriately establish a tree within hard landscaping (assuming a 60 month establishment period).

Potential funding opportunities

- Developer contributions
- National Lottery Community Fund
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council

Timescale

Quick win = <1 year

9.12 Tree planting could be delivered at a few key locations in the next planting season.

Medium-term = 1-5 years

9.13 The majority of tree planting would be delivered across the next five planting seasons to allow for sufficient planning and engagement.

Potential constraints

9.14 A key issue in the successful establishment of trees within hard landscapes is a lack of suitable soil volume for root growth. Within the urban environment, there are usually competing uses for underground space, including utilities. Assessments to identify underground utility constraints would be needed prior to planting. The cost of excavating tree pits within hard landscapes is also more expensive than within soft landscapes. Therefore, new tree planting must achieve the right balance between cost, space and desired function/design. In some circumstances, fewer trees with a larger rooting volume may be appropriate.

9.15 Proposals must be considerate of their location within Pembroke Dock Conservation Area and therefore all new tree planting should enhance the setting of the distinctive historic grid pattern, maintain key vistas, and must not result in detrimental impacts on heritage assets. Therefore, all planting proposals should be prepared in conjunction with both the Historic Building Conservation Officer and the Landscape Officer.

Maintenance and stewardship

9.16 Establish a resident working group to take ownership of the new tree planting. A training day could provide the community with the tools and knowledge to successfully maintain new trees until establishment, including watering and checking tree stakes.

9.17 Watering and establishment care would be needed as part of a 60 month maintenance period to ensure trees are able to become independent in the landscape.

Monitoring for success

9.18 Utilise the resident working group to monitor the successful establishment of new street trees. Establish a communication channel for reporting issues with street trees.

Next steps

9.19 Review the delivery section of the Urban Tree Planting Strategy to determine the process for planting trees within hard landscapes and to understand the key components for successful tree establishment.

9.20 Engage residents and community groups to identify locations for tree planting and selection of species, using the species selection guide within the Urban Tree Planting Strategy.

Figure 9.5: Pembroke Dock



PED11 – Reconfigure and extend the Pembrokeshire Coast Path

9.21 The Pembrokeshire Coast Path at Pembroke Dock bisects the town centre and is not currently accommodated on the coastline. The route forms the eastern boundary of Pembroke Dockyard within a predominantly urban context, following a section of the B4322 Pembroke Street towards Presely View and Treowen Road. The path alignment then moves south to Sykemoor and the low-lying landscape parallel to the Pembroke River. Consideration should be given to re-aligning the route along the waterfront at Llanreath, Pennar Park and Pennar to complement the coastal character of the wider route. The realignment of the route would reduce the need for on-street links, promoting increased

segregation of pedestrians and vehicles. Enhanced connectivity could also be achieved by enhancing secondary branching routes from adjacent residential areas.

9.22 The potential exists to utilise sections of existing Public Rights of Way (PRoW) network where possible, including the public footpath at Military Road (connecting Pennar Park and Pennar). However, route realignments would also be required. It would be necessary to engage with landowners and land occupiers in order to present these opportunities and discuss their impacts on current land-use. Any alterations to the existing route would require funding from Natural Resources Wales (NRW) to ensure any reconfigurations are undertaken to national trail standards and appropriately sign-posted. The project would also require amendments to promotional media associated with the Pembrokeshire Coast Path to ensure changes are communicated to both interested stakeholders and the wider public. Due to the ecological sensitivities of the coastline at this location, the project would need to ensure that the delivery of recreational enhancements is balanced with biodiversity pressures.

Figure 9.6: PED11



Benefits of the project

9.23 Benefits of the project, as depicted in Figure 9.7 below, include:

- Provides active travel opportunities
- Enhances water quality
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing

Figure 9.7: Benefits



Delivery mechanisms

9.24 Delivery of the project would require funding from NRW to undertake the capital works. Support would also be required from the National Trail Steering Group in order to progress the scheme. Additional time resources would be needed as the existing National Trail Officer employed by Pembrokeshire Coast National Park Authority (PCNPA) would not currently have the capacity to deliver a significant reconfiguration of the Pembrokeshire Coast Path.

Potential partners

- Landowners;
- NRW;
- Pembrokeshire County Council (PCC);
- PCNPA; and
- Active Travel Team, forming part of the Transport Strategy Unit at PCC

Outline cost

High cost = >£1 million

9.25 The creation of new paths or path upgrades will be a high cost. Upgrading of signage and street furniture will be a medium cost.

Potential funding opportunities

- NRW
- PCC
- Transport for Wales

Timescale

Long-term = >1 year

9.26 The need for consultation with various stakeholders, engagement with landowners, a collaborative design process and delivery on the ground means the project will likely take around 5 years to deliver in full.

Potential constraints

9.27 The project is likely to be complex, with competing demands to ensure its successful implementation. This includes the requirement for significant external funding and liaison with local landowners. Delivery of the footpath realignment would require co-operation and involvement of NRW as a key stakeholder.

9.28 Due to the complexities of the scheme, the project would require significant staff resource and sustained financial input to reach its full potential. Additional challenges would also involve the need for complex stakeholder and public consultation to ensure local 'buy-in'. A key unknown for the project would be the time required to gain landowner consents.

9.29 Reconfiguration works would involve localised vegetation clearance along some sections of the route. This would need to be undertaken to avoid the bird nesting season and in liaison with an ecologist or Ecological Clerk of Works (ECoW). The potential for erosion and flooding at this location would also form a key challenge in the establishment of a route at this coastal location.

Maintenance and stewardship

9.30 Ongoing maintenance of the route would be required to ensure access is maintained throughout the year. Landscape management works would also be required to ensure the retention of sightlines across the route.

Monitoring for success

9.31 The opportunity exists to install sensors or counters to monitor the usage of the route as part of the wider active travel network within the county. This approach would help measure the success of the substantial investment and inform the long-term strategy and delivery of similar projects in the future.

Next steps

9.32 Undertake a feasibility study and optioneering exercise to determine the preferred route of the path realignment. Initial conversations with landowners to establish potential route options should also be initiated at this stage.

9.33 An ecological assessment and tree survey to BS5837: 2012 should be commissioned to examine the implications on local biodiversity and existing tree cover. Preliminary consultation with interested stakeholders, community groups and the general public should also be progressed to inform early conceptual development of the project.

Figure 9.8: Pembroke Dock



PED17 – Introduce rain gardens, street trees and permeable paving at London Road

9.34 Sections of London Road within Pembroke Dock are at high risk from surface water flooding, including areas to the north of the large car park complex associated with multiple commercial retailers. A Combined Sewer Overflow (CSO) incident (where untreated foul effluent enters rivers due to the

capacity of the sewer infrastructure being exceeded) was also previously recorded at Waterloo Road. Sustainable Drainage Systems (SuDS) interventions which divert storm water from combined sewers would help to reduce fluvial influence in times of flooding.

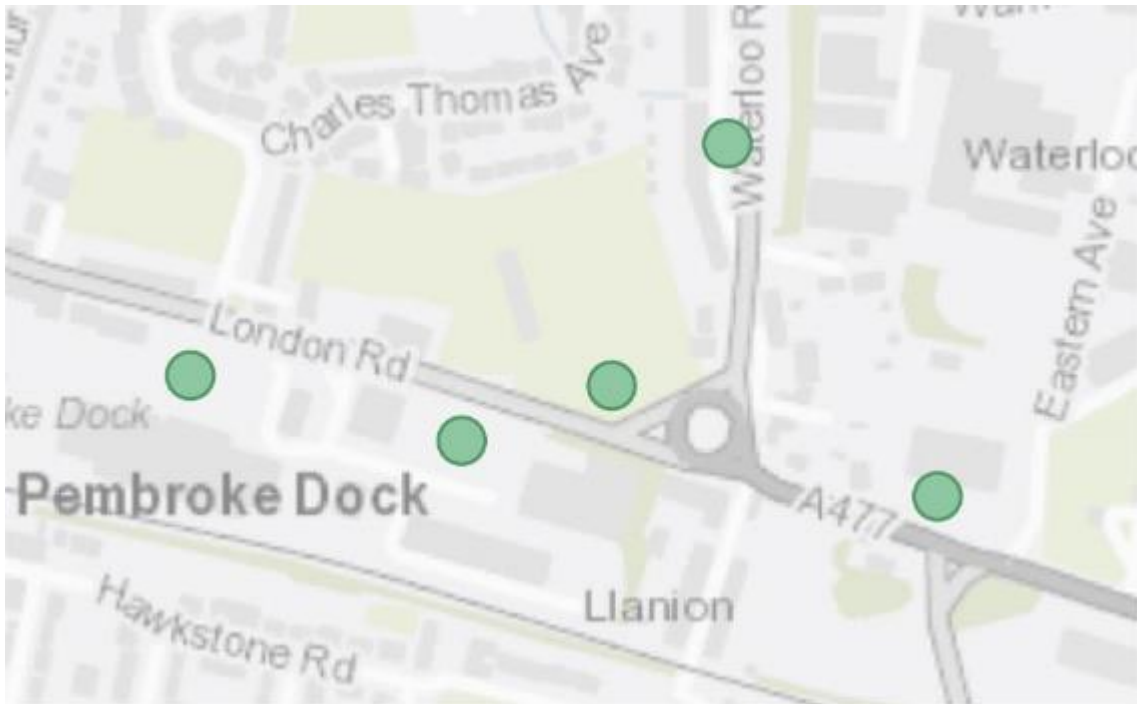
9.35 There are multiple opportunities for intervention. Consideration should be given to retrofitting the large impermeable car park areas with permeable paving, rain gardens and robust tree planting.

9.36 Introduction of these measures in this area would aid the slowing of surface water run-off, helping to reduce potential surface water flood risk and lessen the fluvial input into the sewer system at times of high rainfall. These proposals would also contribute positively to townscape character and biodiversity.

9.37 Working with residents, commercial partners, Pembrokeshire County Council (PCC) and South Wales Trunk Road Agent (SWTRA), locations for interventions should be identified.

9.38 Pembroke Dock's Urban Tree Strategy should be cross-referenced when delivering this project. Proposals for tree planting must also align with walking and cycling routes noted along London Road.

Figure 9.9: PED17



Benefits of the project

9.39 Benefits of the project, as depicted in Figure 9.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Enhances air quality & noise regulation
- Reinforces a sense of place
- Urban cooling
- Improves health and wellbeing

Figure 9.10: Benefits



Delivery of nature-based solutions and ecosystem services

9.40 Rain gardens, permeable paving and concurrent tree planting would deliver improvements to the urban setting and contribute towards a sustainable approach to dealing with rainwater. In a natural habitat, precipitation is slowly absorbed into the ground, slowed by vegetation. However, impermeable surfaces in urban environments direct run-off into storm sewers which may contribute towards CSOs and surface water flooding in the local area.

9.41 The creation of tree planting areas and rain gardens would have a beneficial impact on flood risk, water quality and on carbon sequestration. In addition, the potential for CSO incidents is reduced by removing some of the load on the combined sewer network

Delivery mechanisms

9.42 An initial study should undertake site surveys to identify where the topography, street scene and storm sewer network conditions combine to make interventions both most effective and most deliverable. As part of this, residents should have the ability to put forward requests for rain garden and tree planting.

If the location is appropriate and funding available, the tree should be added to the annual planting programme.

9.43 An annual planting programme should be established for Pembroke Dock to successfully plan, deliver and manage the new tree planting, rain gardens and permeable paving areas across the London Road area. Sufficient planning is required prior to the bare-root planting season (October-March at the latest) to ensure ground checks / soil testing is completed.

9.44 Trees should be delivered in accordance with the delivery section of the Urban Tree Planting Strategy.

Potential partners

- Local community
- PCC Highways and Transport Department
- PCC StreetCare / Amenity Maintenance Team
- Local businesses
- Tree Wardens Pembrokeshire
- Dwr Cymru Welsh Water
- South Wales Trunk Road Agent (SWTRA)

Outline cost

Medium to high cost = <£250k - £1 million

9.45 Price is scalable depending on the number of trees planted / rain gardens created/ permeable paving areas installed. However, a rough estimate of ~£10,000 to appropriately establish a tree within hard landscaping should be applied..

Potential funding opportunities

- Developer contributions
- National Lottery Community Fund
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council

Timescale

Quick win = <1 year

9.46 Tree planting and rain garden creation should be delivered at a few key locations in the next planting season.

Medium-term = 1-5 years

9.47 The majority of tree planting, rain garden creation and permeable paving aspects should be delivered across the next five planting seasons to allow for sufficient planning and engagement.

Potential constraints

9.48 There are a considerable number of potential stakeholders to engage with for this project, with various landholders and the engagement process critical to the success of the scheme. London Road (A4139) is a major road, hence PCC Highways and Transport Department and the SWTRA must be involved in the project.

9.49 Although there is a large area for improvements within the car parking areas, space along the carriageway is limited, with competing priorities including cycle lanes and pedestrian walkways. The majority of the surfacing within the potential project area is characterised by hard landscape. The cost of excavating tree pits within hard landscapes is more expensive than within soft landscapes. Therefore, new tree planting must achieve the right balance between cost, space and desired function / design. In some circumstances, fewer trees with a larger rooting volume may be appropriate.

9.50 Within the urban environment the potential for a variety of services and utilities to be located within potential planting areas and avoidance of these must be considered when accounting for the installation of tree planting. Rain gardens typically require shallower depths of installations and would therefore have a lower probability of conflict with services. There may be the potential for substituting tree planting in favour of rain gardens in areas identified to have a high probability of services.

Maintenance and stewardship

9.51 Establish a resident or commercial partner working group alongside PCC Street Care and Highways Department to take ownership of the new tree planting. A training day could provide the community with the tools and knowledge to successfully maintain new trees until establishment, including watering and checking tree stakes.

9.52 Watering and establishment care would be needed for the 60 month establishment phase to ensure trees are able to become independent in the landscape.

9.53 Permeable paving areas would need to be either adopted by PCC or by the relevant landowner.

Monitoring for success

9.54 Subject to the availability of funding, monitoring of the success of the project should be in conjunction with data from Dwr Cymru Welsh Water in terms of sewer capacity and reduction in CSO events.

9.55 Utilise the resident working group to monitor the successful establishment of new street trees and gardens. Establish a communication channel for reporting of any issues or failures.

Next steps

9.56 Immediately identify landholders and commercial partners and engage with potential stakeholders, including SWTRA and the appropriate departments of PCC.

9.57 Survey the area to ascertain areas best suited for intervention.

9.58 Review the delivery section of the Urban Tree Planting Strategy to determine the process for planting trees within soft landscapes and understand the key components for successful tree establishment.

9.59 Engage residents and community groups to identify locations for tree planting and selecting species, using the species selection guide within the Urban Tree Planting Strategy.

Project Long List

PED1 - Rejuvenate Pembroke Dock Youth Club playground

9.60 Work with the Pembroke Dock Youth Club to design a new playful space which is rich in biodiversity. Damaged play equipment should be removed and replaced with robust and adventurous natural play features. New sociable spaces, including swings, seating and climbing bars to appeal to teenage girls, should be introduced. The potential exists to deliver a community garden within the fenced perimeter of the Youth Club, incorporating orchard trees and edible hedges. Additional tree boundary planting and pollinator friendly 'wild edges' should also be introduced in conjunction with wider access improvements along Bush Street.

PED2 - Create a hierarchy of street tree planting

9.61 Refer to Kickstarter Projects.

PED3 - Enhance Western Way Green for people and pollinators

9.62 This open space is characterised by an undulating mound of amenity grass. Use of the banks for adventurous climbing and seating could be installed alongside the existing slide, as well as wildflower meadows to create a welcoming and playful space. Additional opportunities for formal and informal seating should be incorporated into the space, helping users (both residents and tourists) take advantage of long range views. Interpretative signage, cycle

stands and electric bicycle charging stations should also be installed. Working in partnership with Pembroke Dock Town Council and Pembrokeshire County Council (PCC), consideration should also be given to retrofitting the large car park area with permeable paving, street trees and rain gardens to reduce the run-off entering local combined sewers.

PED4 - Create a wildlife corridor along Military Road

9.63 Establish wildflower meadows and street trees on the wide verges through residential areas to provide opportunities for shading, ensuring proposals do not conflict with proposals for a shared-user path along Military Road. Gaps in the extent of the woodland shelter belt should be filled to buffer any run-off from the adjacent golf course and agricultural land flowing into the River Pembroke. Species diversity of the hedgerow running alongside the carriageway could also be strengthened through the planting of species such as hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) to provide further habitat for nesting birds.

PED5 - Create wildlife stepping stones at the South Pembrokeshire Golf Course

9.64 The Golf course creates local habitat severance. Expansion of the current areas of woodland should be considered, alongside tree planting along the PRoW connecting Victoria Road to Cross Park and the perimeter of Pennar School. Consideration should also be given to retaining areas of rough grass between fairways as space for birds and invertebrates to shelter. The use of pesticides, or other chemicals, that are contributing to water quality issues within River Pembroke and the wider catchment should be reduced.

PED6 - Revive Carriage Drive

9.65 Diversify the structure of the existing woodland to allow light to diversify the ground flora, supporting pollinator species. Dead wood should be retained in place to provide additional habitat. Interpretation boards which celebrate the heritage of the area should also be introduced.

PED7 - Create a wildlife garden at South Pembrokehire Hospital

9.66 Working in conjunction with volunteers, the creation of a wildlife and sensory garden should include native tree planting, dead wood piles, wildflower meadows and bird boxes. The space could be used by patients, staff and visitors to seek a place of peace and tranquillity.

PED8 - Enhance biodiversity at Memorial Park

9.67 Memorial Park is a well-used greenspace, offering key routes from the town centre to the surrounding residential areas. However, interventions should be implemented to improve the biodiversity of the park. Working in conjunction with Pembroke Dock Community School, proposals could include increasing the ground flora beneath large trees through the use of plug planting and the establishment of wildflower meadows. Consideration should also be given to specimen tree planting to plan for tree succession. The Active Travel Network Map includes proposals for additional accessibility improvements at this location.

PED9 - Enhance the biodiversity of Pembroke Dock Cemetery

9.68 Burial grounds offer vitally important habitats for local biodiversity. 'Messiness' and increased structural diversity should be encouraged as a mechanism to create feeding, nesting, roosting and hibernating spaces. Existing routes within the site should continue to be maintained and access to tended graves made available throughout the year. Educational signage to promote the changes to the maintenance regime, including relaxed mowing regimes in some areas, should be installed to help visitors understand the rationale for the alterations.

PED10 - Enhance the greening of land to the rear of ASDA

9.69 Land at the rear of ASDA is uninviting and is not currently providing a coherent function for people or wildlife. A network of temporary raised planters with native pollinator friendly plants should be implemented as a measure to provide aesthetic interest and biodiversity value in the short-term. Working in partnership with Pembroke Dock Town Council and ASDA, consideration should also be given to the introduction of greening interventions such as permeable paving, street trees and rain gardens within the car park area.

PED11 - Reconfigure and extend the Pembrokeshire Coast Path

9.70 Refer to Kickstarter Projects.

PED12 - Enhance the biodiversity value of Bush Street playing field

9.71 The playing field on Bush Street is currently home to Pennar Robins Football Club and opportunities could be explored to enhance the biodiversity value of the site. Working with the landowner to maintain the recreational use of the playing fields, the steeply sloping grass verges around the perimeter could be transformed into wildflower meadows through the sowing of wildflower seed and modifications to the mowing regime. Plug plants should also be planted along the wide verge of St Johns Road to increase pollinator food sources. Consideration should also be given to the installation of increased cycle parking to encourage active travel.

PED13 - Promote increased biodiversity value of Skyemoor Valley

9.72 Sykemoor Valley offers core pollinator habitat within the town. Open rides and glades should be created in the woodland to encourage a diverse ground flora and areas of dead wood retained in-situ. The introduction of additional tree planting on Sykemoor Fields would buffer and extend this woodland block. Consideration should also be given to the implementation of Sustainable Drainage Systems (SuDS) interventions to aid with natural flood management.

PED14 - Enhance the greening of car parks

9.73 Introduce raised planters and tree planting within car parks around the town, for example at Llanreath, Hobbs Point, Fort Road and Gordon Street to enhance the setting of these areas and help promote wider pollinator connectivity. Tree planting proposals should be locally appropriate and tolerant of exposure and salt-laden winds.

PED15 - Create wildflower meadows at PCNPA HQ

9.74 Swathes of wildflower meadow should be created to enhance the plots within the curtilage of the Pembrokeshire Coast National Park Authority (PCNPA) offices. This intervention would provide additional habitat and connectivity across Pembroke Dock for pollinators. Additional tree planting should also be provided within the adjacent grassed verges by the car parking, whilst ensuring the retention of views across Milford Haven.

PED16 - Reduce flood risk along Bush Street

9.75 Land within close proximity to Pembroke Dock Youth Club is at risk of surface water flooding. It is recommended that measures should be implemented to provide natural rainwater attenuation. Furthermore, the adjacent car park should be installed with permeable paving, marginal rain gardens and tree planting to reduce the extent of hardstanding and promote infiltration.

PED17 - Introduction of rain gardens, street trees and permeable paving at London Road

9.76 Refer to Kickstarter Projects.

PED18 - Enhance the biodiversity value of Military Cemetery

9.77 Working in conjunction with the Ministry of Defence (MoD) as land-owners, develop a long-term management plan and biodiversity strategy to enhance the biodiversity and landscape value of the site. Consideration should be given to

the establishment of a tree replenishment programme and wildflower meadow to improve the value of the site to pollinators. The opportunity also exists to enhance habitat linkages through the provision of wildlife corridors within the surrounding context.

PED19 - Enhance the recreational and biodiversity value of public open space on Charles Thomas Avenue

9.78 Seek to enhance the recreational and biodiversity value of the existing public open space lying to the rear of the electrical sub-station on Charles Thomas Avenue. Currently a under-used resource, the opportunity exists to utilise the site for informal recreation, natural play or for local biodiversity enhancements. Consideration should also be given to the potential of the site as a community growing space given its proximity to adjacent residential properties.

Chapter 10

Saundersfoot

Figure 10.1: Saundersfoot



A Portrait of Saundersfoot's Green Infrastructure

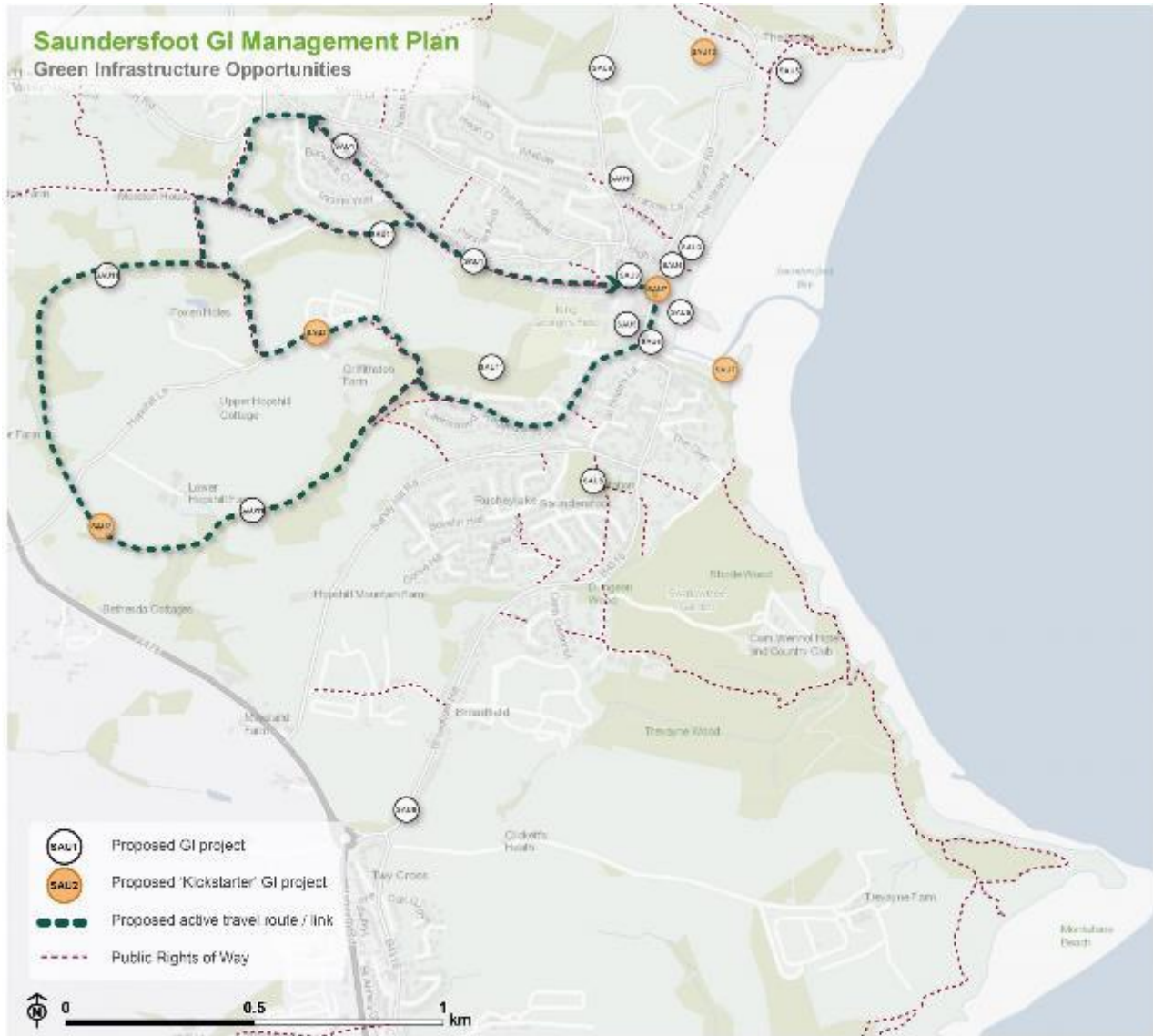
10.1 Saundersfoot is a large village on the south eastern coast of Pembrokeshire, with a population of over 3,000 and located within the

Pembrokeshire Coast National Park. A relatively low-lying coastal settlement with medieval origins, the Saundersfoot Conservation Area lies at the eastern edge of the town and contains numerous listed cottages and buildings with maritime characteristics. There is modern tourism development along the coast as well, partially owing to the popular Saundersfoot Beach and Coppet Hall Beach. The marine environment around Saundersfoot is internationally recognised for its ecological value through the Carmarthen Bay Special Protection Area (SPA), and the Carmarthen Bay and Estuaries / Bristol Channel Approaches Special Area of Conservation (SAC) designations. The area is also nationally recognised through the Waterwynch Bay to Saundersfoot Harbour Site of Special Scientific Interest (SSSI) and Saundersfoot – Telpyn Coast SSSI designations.

10.2 Areas of public open space are relatively limited within Saundersfoot, with the beaches and Pembrokeshire Coast Path providing the most significant recreation asset for visitors and tourists. National Cycle Network (NCN) route 4 also passes north-south through the town. A somewhat fragmented network of Public Rights of Way (PRoW) exists in the western residential neighbourhoods of Saundersfoot, with few direct connections to the coast or into the wider Pembrokeshire Coast National Park. The Incline, a Scheduled Monument and public footpath, could be better integrated into the existing network of public rights of way to improve connectivity between the western and eastern sides of town.

10.3 Dense areas of woodland, frequently ancient, cover areas of Saundersfoot and the surrounding countryside, including at Rhode Wood to the south and The Plantation. Meandering belts of woodland following river valleys extend from King George's Field and separate the northern and southern residential areas of Saundersfoot. These woodland corridors offer opportunities to create connections for wildlife and people between the densely settled coastal zone in the east to the rural landscape in the west.

Figure 10.2: GI Opportunities within Saundersfoot



- SAU1** Enhance wayfinding at The Incline
- SAU2** Create a network of circular routes
- SAU3** Introduce urban greening mechanisms along The Strand
- SAU4** Enhance habitat provision in Saundersfoot Sensory Garden
- SAU5** Promote the greening of existing car parks
- SAU6** Enhance the greening of the B4318
- SAU7** Introduce and reinstate raised planters at Saundersfoot Harbour
- SAU8** Develop a management plan for Saundersfoot Plantation
- SAU9** Enhance vacant land on Milford Street
- SAU10** Enrich green verges outside Saundersfoot School
- SAU11** Extend riparian buffers along watercourses in the west
- SAU12** Extend areas of riparian woodland, shelterbelt and field margin opportunities in the north

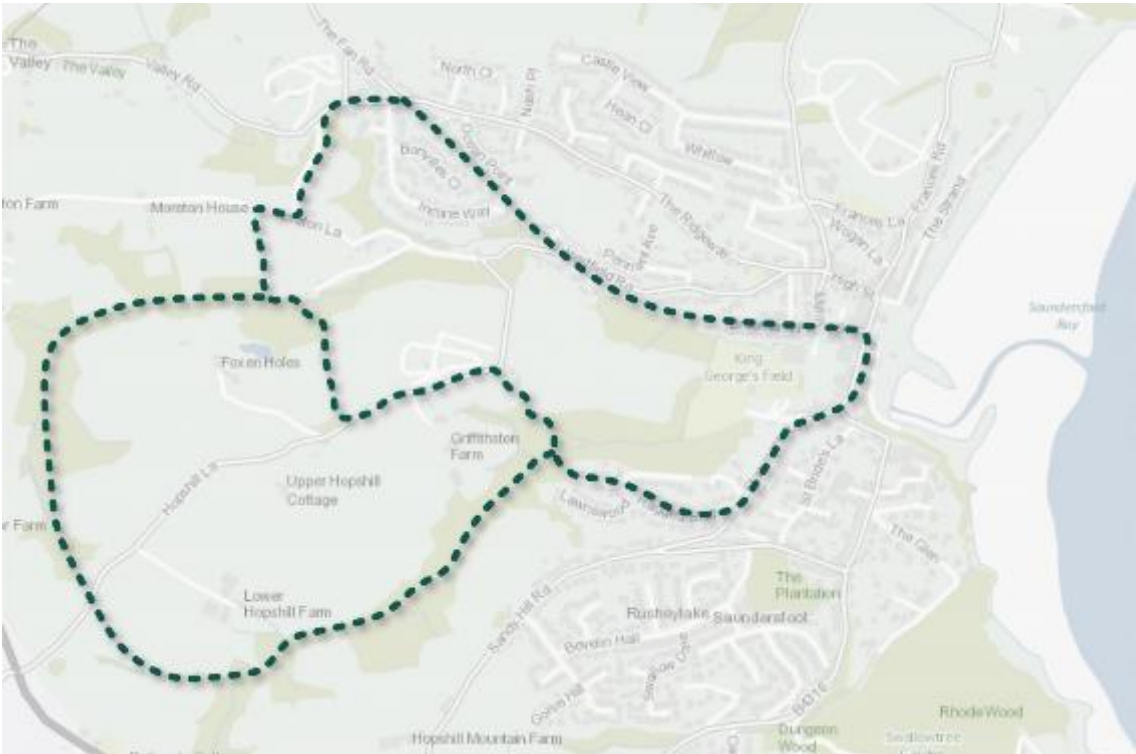
Kickstarter Projects

SAU2 – Create a network of circular routes

10.4 The opportunity exists to create a series of promoted circular walks to the west of Saundersfoot, helping to connect visitors and residents to the wider Pembrokeshire Coast National Park landscape, whilst also promoting active lifestyles. The settlement currently boasts a network of Public Rights of Way (PRoW) which offer a range of walking opportunities, including a bridleway accommodated on Moreton Lane with adjoining public footpaths radiating along its route. This project, therefore, proposes the utilisation of these existing routes, supplemented with new paths to create attractive circuitous routes which facilitate interactions with nature. The existing public footpath at The Incline, the former route of a tramroad incline formation, should also be incorporated within the proposals to provide a hierarchy of circuitous routes. The design of these routes offers the opportunity to promote accessibility and inclusivity for a range of users, including walkers and wheelchair users.

10.5 The establishment of these circuitous routes would enhance the recreational offer at both the local and strategic scale. The potential integration of a range of robust, low maintenance street furniture, interpretation, signage and incidental natural play features along the routes would also help to enhance their recreational offer. However, the creation of any new sections of PRoW would require an assessment of the natural habitat to determine if the introduction of public access is sustainable and should be promoted. Potential conflicts between biodiversity and recreational access opportunities would need to be assessed. Consideration should be given to the introduction of a 'code of conduct' for appropriate behaviour on ecologically sensitive sections of the route to help encourage more responsible recreation.

Figure 10.3: SAU2



Benefits of the project

10.6 Benefits of the project, as depicted in Figure 10.4 below, include:

- Provides active travel opportunities
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Reinforces a sense of place
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 10.4: Benefits



Delivery mechanisms

10.7 A grant application would be required to secure funding for the capital works, including the production of promotional material, street furniture and signage, associated with this project.

10.8 However, significant external funding and allocation of staff resource would be required if new sections of PRoW were required to deliver the project. The project would need to be underpinned by cooperative landowners and a sustainability assessment to determine the appropriateness of introducing public access.

Potential partners

- Pembrokeshire Coast National Authority (PCNPA);
- Landowners; and
- Natural Resources Wales

Outline cost

10.9 The costs of the project would be dependent on the degree to which the proposed route alignments would re-use the existing PRow network as well as the extent of proposed street furniture and associated signage.

Potential funding opportunities

- PCNPA

Timescale

10.10 The timescales for the implementation of proposals which involve the re-use of existing PRow to create circuitous recreational routes would be short to medium term in duration. However, where the designation of new PRow is required, this would be more onerous and longer term.

Potential constraints

10.11 If the project re-uses existing PRow, securing the necessary funds for delivery of the project and ensuring community buy-in would form the principal constraints.

10.12 If the project creates new sections of PRow, this would likely be complex, with competing demands. This includes the requirement for significant external funding and liaison with local landowners to ensure buy-in on privately owned land. It would be necessary to engage with landowners and land occupiers in order to present these opportunities and discuss their impacts on current land-use. However, a key unknown for the project would be the time needed to gain these landowner consents.

10.13 The project may also require localised vegetation clearance along some sections of the route. This would need to be undertaken to avoid the bird nesting season and in liaison with an ecologist or Ecological Clerk of Works (ECoW).

Maintenance and stewardship

10.14 Ongoing annual maintenance of the hard surfacing of the routes would be required to ensure access is maintained throughout the year. Landscape management works would also be required to ensure the retention of sightlines across the route.

Monitoring for success

10.15 The opportunity exists to install sensors or counters to monitor the usage of the routes as part of the wider active travel network within the county.

Next steps

10.16 Engage with the PCNPA to ascertain appetite and budget to progress with an assessment, feasibility study and optioneering exercise to identify the proposed network of circuitous routes.

Figure 10.5: Saundersfoot



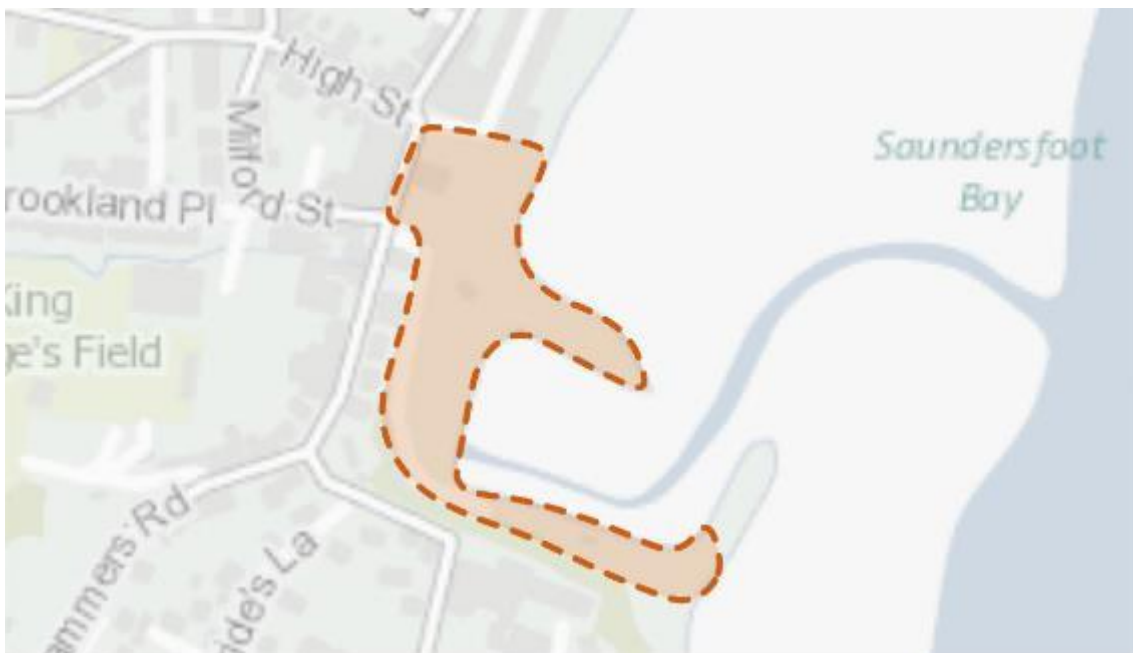
SAU7 – Introduce and reinstate raised planters at Saundersfoot Harbour

10.17 Ocean Square would benefit from the addition of raised planters along Saundersfoot Harbour towards the Wales International Coastal Centre, broadly following the alignment of the existing cycle route. This should be coupled with re-planting the existing raised brick planters next to the car park with native, salt-tolerant perennials to attract pollinators. Additional tree planting should also be considered in areas of hard landscape to delineate key entrances to the harbour (e.g. from The Strand / High Street entrance). This would complement the existing planters on Stammers Road. These planters should be maintained with native nectar rich flowers.

10.18 As much of Saundersfoot Harbour falls within Flood Zones 2 and 3, the planters could also function as Sustainable Drainage Systems (SuDS). Rain garden planters provide appealing adaptation features which can be used to regulate surface water flows and reduce surface water flood risk. Rain garden planters utilise rainwater that can be diverted directly into the planter where the soil absorbs and stores the rainwater for the plants to use, known as bioretention.

10.19 Signage should be used to communicate the function of the planters and help raise awareness regarding the importance of pollinators.

Figure 10.6: SAU7



Benefits of the project

10.20 Benefits of the project, as depicted in Figure 10.7 below, include:

- Reduces the risk of flooding
- Investment & enhanced visitor experience

- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Reinforces a sense of place
- Improves health and wellbeing

Figure 10.7: Benefits



Delivery mechanisms

10.21 Planters and hanging baskets should be delivered in accordance with the delivery section of the Pollinator Strategy. Local businesses along Saundersfoot Harbour may be interested in sponsoring planters outside their shops in return for advertising or promotion.

Potential partners

- Pembrokeshire County Council (PCC) StreetCare / Amenity Maintenance Team
- Local businesses

Outline cost

Low cost= <£250k

10.22 The capital expenditure required for raised planters is relatively low. However, rain garden planters would be more expensive but provide additional benefits and potential savings in mitigating surface water damage.

Potential funding opportunities

- Local Places for Nature Fund
- Sponsorship from local businesses

Timescale

Quick win = <1 year

10.23 Projects could be implemented on the ground almost immediately.

Potential constraints

10.24 For the planters to successfully establish, maintenance would be required. Without this they may become visually unappealing and lose community support. As the planters would be located in public locations, they may also be disturbed or damaged by antisocial behaviour.

Maintenance and stewardship

10.25 Throughout the spring and summer, planters should be watered daily. When plants are in flower they may benefit from a high potassium liquid feed fortnightly. Containers or pots should have good drainage to prevent waterlogging. To prevent plants getting too wet and cold over winter, they should be raised slightly off the ground and placed against the shelter of a wall. Local businesses or homeowners within closest proximity to the planters could be engaged to assist with this maintenance.

Monitoring for success

10.26 The success of the planters could be recorded by the number of pollinating insects they attract and the diversity of species. The Flower-Insect Timed Counts (FIT Counts) methodology has been developed by the UK Pollinator Monitoring Scheme. This involves counting the insects visiting one of the 14 flower species target flowers within a 50cm by 50cm square patch for 10 minutes in good weather. Local people could partake in this as a citizen science programme.

10.27 Success could also be monitored by recording how many additional planters have been installed by local residents or businesses.

Next steps

10.28 Review the delivery section of the Pollinator Strategy to determine the process and review case studies relating to the installation of planters and hanging baskets.

10.29 Consult with PCC StreetCare / Amenity Maintenance Team.

10.30 Engage with local residents and businesses to establish interest in sponsoring and/or maintaining planters within the town centre.

Figure 10.8: Saundersfoot



SAU12 – Extend areas of riparian woodland, shelterbelt and field margin opportunities to the north

10.31 Saundersfoot has a history of flood events, typically as a result of storm surges that funnel into Carmarthen Bay from the Bristol Channel.

10.32 Land to the north of Saundersfoot CP School and Scar Farm Holiday Park offers the potential for shelterbelt, field margin and riparian woodland

opportunities. Currently vacant, this land is bisected by a small watercourse which feeds into Saundersfoot Bay from Coppet Hall Beach. These interventions would help to alleviate surface water flood risk, providing storage for floodwater and helping to connect woodland areas that surround Hean Castle and border Peggy James Wood to the north.

10.33 Whilst the land west of the proposed site has been allocated in Local Development Plan 2 [See reference 3] for residential development (HA3 North of Whitlow), design requirements include a woodland buffer to the north of the site which would link riparian woodland planting across the area. A public footpath is also proposed around the perimeter of the site. The opportunity exists to extend this route into the site itself to encourage community engagement with woodland and shelterbelt.

Figure 10.9: SAU12



Benefits of the project

10.34 Benefits of the project, as depicted in Figure 10.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Enhances air quality & noise regulation
- Carbon sequestration & climate mitigation

Figure 10.10: Benefits



Delivery of nature-based solutions and ecosystem services

10.35 Land use management for the previous 90 years has involved increased drainage of the land, in a drive to maximise efficiency of farmland. This has led to a reduction in the diversity of habitats, the loss of wetlands, wet-grassland and associated wet terrestrial habitats. It has also increased flood risk, as it increases the speed and volume of water flow down catchments, reducing the buffering effect of the landscape during heavy and prolonged rainfall events. Increased drainage of wet soils also has a detrimental effect on the ability of soil to sequester carbon.

10.36 Through the use of agroforestry techniques such as riparian buffer strips, planting of shelter belts and field margins, the ability of the landscape to absorb and buffer rainfall and surface runoff would be significantly increased. This would have a concomitant beneficial impact on flood risk, water quality and carbon sequestration, as re-wetting of wetland soils would increase their capacity to absorb and lock-in carbon.

Delivery mechanisms

10.37 An initial site survey and scoping should be conducted by trained citizen scientists, Pembrokeshire County Council (PCC) staff or trained consultants. It would be necessary to engage with landowners and land occupiers / graziers in order to present this opportunity and discuss its impacts on current land-use.

10.38 We envisage the proposed physical interventions and amendments to land management could be delivered by the landowners themselves, or by external agricultural contractors.

Potential partners

- PLANED – Pembrokeshire Sustainable Agriculture Network (PSAN)
- Wildlife Trust of South and West Wales
- Natural Resources Wales (NRW)
- Landholders

Outline cost

Low cost = <£250k

10.39 Costs would comprise some limited specialist advice, land agent fees, fencing and tree planting costs.

Potential funding opportunities

- Pembrokeshire Coast National Park Authority (PCNPA)
- Developer contributions (due to Local Development Plan 2 [See reference 4] woodland buffer requirements)
- Emerging Welsh Government Sustainable Farming Scheme
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council
- National Forest for Wales – The Woodland Investment Grant (National Lottery Heritage Fund – Round 1)
- NRW grants
- Nature Networks Fund

Timescale

Quick win = <1 year

10.40 Riparian tree planting, shelterbelt and field margin creation could be delivered at a few key locations in the next planting season, with landscape maintenance required across the 60 month establishment phase. A key

unknown for the project would be the time taken to gain landowner / occupier / grazier agreements / consents and source funding.

Medium-term = 1-5 years

10.41 The majority of tree planting should be delivered across the next five planting seasons to allow for sufficient planning and engagement.

Potential constraints

10.42 A key constraint for the project would be landowner / occupier / grazier agreements, as there may be a perceived risk to farm viability associated with some loss of land to riparian margins / shelter belts / field margin planting etc. These concerns should be countered with the availability of agricultural payments for environmental goods and services, and hence the delayed launch of the Welsh Government's Sustainable Farming Scheme is a potential constraint in this regard.

10.43 An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Maintenance and stewardship

10.44 Maintenance of the softworks and wetland would be required as part of the 60 month establishment phase, including the replacement of failed trees.

Monitoring for success

10.45 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science, with suitable support.

Shelterbelt success is often dependant on initial design but also subsequent care and management using silvicultural techniques to maintain the shelterbelt beyond the life expectancy of the original tree planting.

Next steps

10.46 Engage with landowners / occupiers / graziers and enter into agreements to deliver interventions on their land. Consultation with NRW should also be undertaken to investigate whether the project benefits aligns with the Four Rivers for LIFE project and potential funding opportunities. The potential for nutrient credits to offset project costs should also be explored.

Figure 10.11: Saundersfoot



Project Long List

SAU1 - Enhance wayfinding at The Incline

10.47 Forming part of a wider initiative to provide linkages with Saundersfoot Station, enhance wayfinding, signage, seating and boundary features along The Incline from Brooklands Place, Westfield Road and The Ridgeway.

Consideration should be given to the improved interpretation of heritage features at entrances and along the route itself. Re-surfacing works should also be undertaken, particularly focusing on the upper extents where the path is worn and overgrown. This location is an important dormouse corridor.

Proposals should therefore aim to strengthen the existing hedgerow structure, whilst providing species-rich edge habitat for pollinators.

SAU2 - Create a network of circular routes

10.48 Refer to Kickstarter Projects.

SAU3 - Introduce urban greening mechanisms along The Strand

10.49 Review parking provisions along The Strand and reclaim some parking bays for urban greening, whilst ensuring retention of adequate space for disabled parking and loading. The opportunity exists to utilise this reclaimed space for the planting of street trees, cycle parking, parklets, seating and cafe spill out areas.

SAU4 - Enhance habitat provision in Saundersfoot Sensory Garden

10.50 The existing sensory garden / pocket park provides an area for ornamental planting and quiet relaxation within Saundersfoot Harbour. The space would benefit from enhanced planting with native, salt-tolerant flowering species, as well as additional habitat features such as log piles and insect hotels to increase the site's biodiversity benefits.

SAU5 - Promote the greening of existing car parks

10.51 Saundersfoot's car parks, including Brooklands Close and the Harbour, comprise large expanses of hard landscaping. However, minor reconfiguration works should be explored in order to provide the opportunity for tree planting and interpretative signage within these sites. Additional greening in these locations would also divert stormwater from combined sewers and help reduce fluvial influence in times of flooding.

SAU6 - Enhance the greening of the B4316

10.52 As the primary route through Saundersfoot, greening of the B4316 would help to create a welcoming gateway to the settlement and provide linkages with the proposed shared-user path. The re-purposing of disused planters along the route would provide additional pollinator habitat and commuting corridors. Furthermore, the creation of wildflower meadows on the grass verges at the junction with the A478 at New Hedges would help to create a welcoming gateway which connects with existing verges along Narberth Road.

SAU7 - Introduce and reinstate raised planters at Saundersfoot Harbour

10.53 Refer to Kickstarter Projects.

SAU8 - Develop a management plan for Saundersfoot Plantation

10.54 Encourage the establishment of an interest group / community group and develop a plan for the future management of the site, including the provision of access improvements via Sandyhill Road. Tree and ecological surveys would be beneficial to inform future management practices if not already available.

SAU9 - Enhance vacant land on Milford Street

10.55 The existing area of vacant land at the corner of Milford Street and Brooklands Close could potentially be used to enhance local habitat provision. Landowner engagement would be required to help understand future aspirations for the site and the potential for 'meanwhile uses' such as wildflower meadows.

SAU10 - Enrich green verges outside Saundersfoot School

10.56 The current green verges outside Saundersfoot School at the junction of the B4316 and Church Terrace are characterised by short-mown amenity grassland and low maintenance shrub planting. Replacement of these areas with pollinator-friendly rain gardens and small tree species, would provide a more welcoming gateway to the school, whilst providing for pollinators.

SAU11 - Extend riparian buffers along watercourses in the west

10.57 Explore opportunities to extend riparian tree planting along the two watercourses to the west of Saundersfoot, including around Moreton Lane. Additional field margin buffers on agricultural land should be utilised to enhance water quality and control nutrient run-off into adjoining watercourses, as well as slowing the flow of water upstream of Saundersfoot.

SAU12 - Extend areas of riparian woodland, shelterbelt and field margin opportunities in the north

10.58 Refer to Kickstarter Projects.

Chapter 11

St Davids

Figure 11.1: St Davids



A Portrait of St Davids' Green Infrastructure

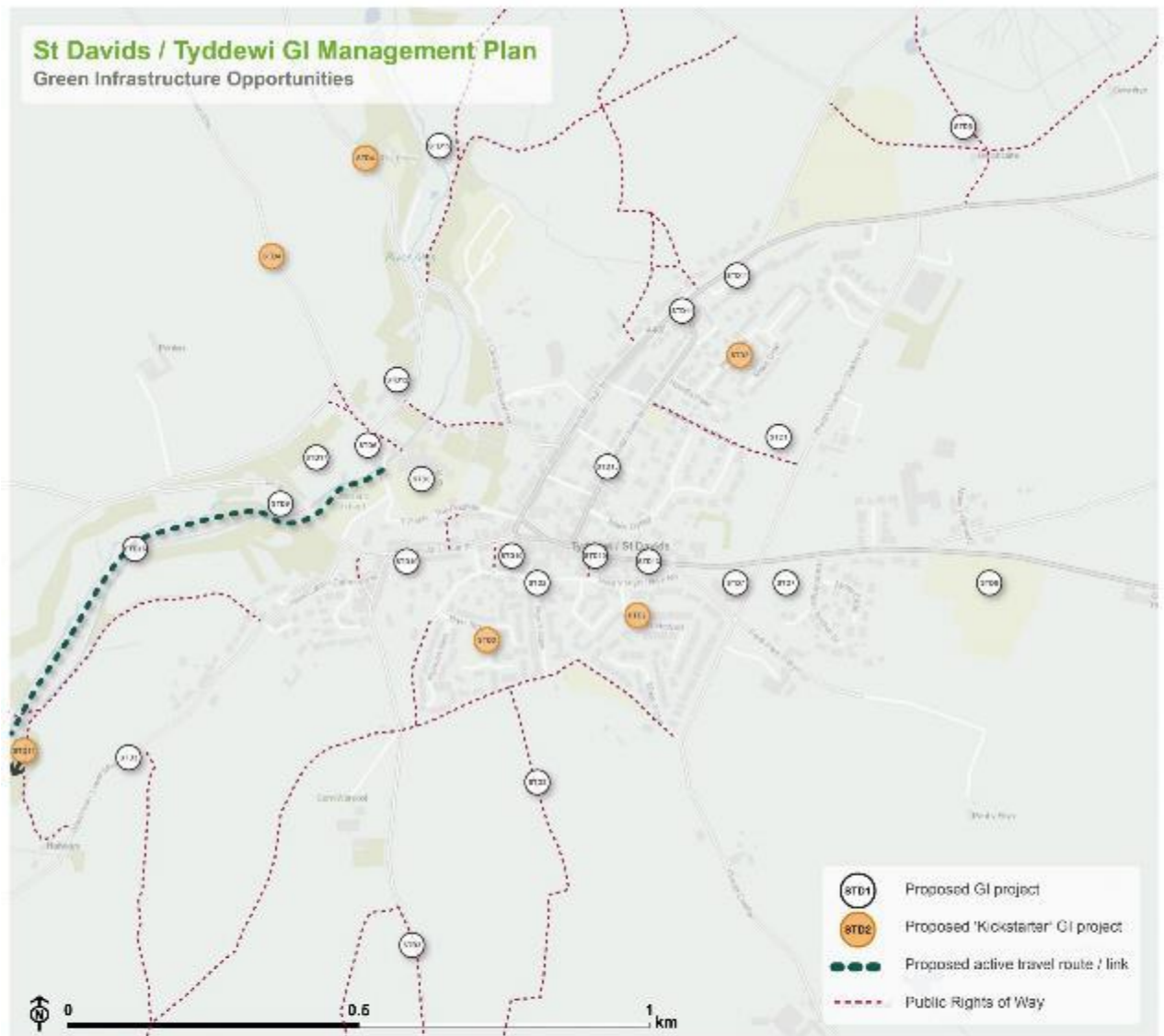
11.1 St Davids is a small, rural city in north west Pembrokeshire, located slightly inland on the St Davids Peninsula and within the Pembrokeshire Coast National

Park. The historic core of the city lies within a Conservation Area, which contains numerous Grade I and II listed structures. Multiple Scheduled Monuments associated with the Grade I listed St Davids Cathedral and Bishop's Palace are concentrated to the west of the settlement's core.

11.2 The River Alun passes along the western edge of St Davids and provides a wooded wildlife corridor with intermittent Public Rights of Way (PRoW) and open access land along its path. To the north east of the city lies the North West Pembrokeshire Commons Special Area of Conservation (SAC), a National Trust site which hosts biologically important woodland, heathland and grassland, and is also designated as open access land. Within the densely settled core of the city, open space and tree cover are relatively limited.

11.3 Overall connectivity around the city is strengthened by the network of Public Rights of Way (PRoW) concentrated to the north and south of the settlement core. These connect the city down to the Pembrokeshire Coast Path in the south and the Pembrokeshire Commons SAC in the north. A number of recreational cycle routes and National Cycle Network (NCN) route 4 also connect the city with the surrounding coastline and beaches. However, linkages between these existing walking and cycling routes are somewhat disjointed and there are opportunities for improving connectivity for both wildlife and people across the city.

Figure 11.2: GI Opportunities within St Davids



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| <p>STD1 Deliver a new community growing space / allotments on Glasfryn Road</p> <p>STD4 Provide an active travel link to Whitesands Bay</p> <p>STD7 Develop pollinator provision at Oriol y Parc Gallery and Visitor Centre</p> <p>STD10 Address gaps in St Davids Pollinator Trail</p> <p>STD13 Introduce a network of street trees on New Street and the A487 High Street</p> <p>STD16 Create a pedestrian link connecting St Davids and Porthcals adjacent the River Alun</p> | <p>STD2 Introduce urban greening within existing residential areas</p> <p>STD5 Improve sensitive access to North West Pembrokeshire Commons SAC and Dowrog Common</p> <p>STD8 Enhance the habitat potential of sports pitches at Ysgol Penrhyn Dewi</p> <p>STD11 Enhance the greening of Nun Street</p> <p>STD14 Create wetlands adjacent to St Davids Wastewater Treatment Works</p> <p>STD17 Develop a network of circular walks on land surrounding Bishops Palace</p> | <p>STD3 Enhance connections with the Pembrokeshire Coast Path</p> <p>STD6 Enhance the setting of St Davids Cathedral and the Bishop's Palace for pollinators</p> <p>STD9 Enrich existing habitat at Merivale Car Park / Bishop's Palace</p> <p>STD12 Locally promote community food growing opportunities</p> <p>STD15 Deliver floodplain reconnection and tree planting</p> |
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Kickstarter Projects

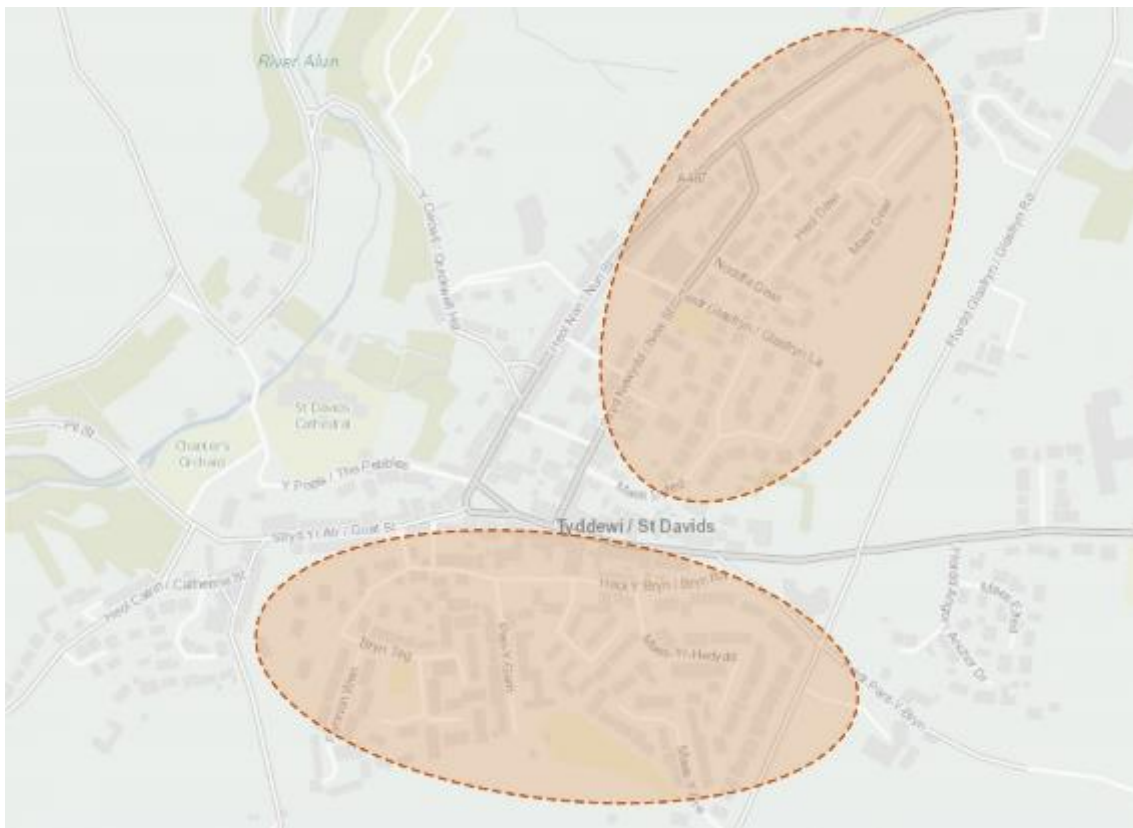
STD2 – Introduce urban greening within existing residential areas

11.4 Streets form an important aspect of public space. The attractiveness of streets can have a significant impact on the wellbeing of residents, with greener and tree-lined streets providing better settings for social interactions, informal play and local pride.

11.5 A number of St Davids' residential areas host grass verges, wide pavements and redundant carriageway space which offer the opportunity to host a greater diversity of urban greening interventions. Neighbourhoods include around Heol Dewi, Mount Gardens and Maesdyfed within the north of St Davids, and around Bryn Rod, Maes-Y-Hedydd, Pen Y Garn, Brynteg and Ffynnon Wen in the south of the city. Some of these street-facing spaces fall within private ownership and would require engagement with residents to encourage and support them to take on some additional greening activities such as tree, shrub and perennial planting.

11.6 Where spaces are identified, additional street trees, specimen trees, rain gardens and wildflower meadows should be established. Residents could also be empowered to green their own private street-facing spaces, particularly focusing on planting the 'right tree in the right place', selecting pollinator-friendly plants and delivering small-scale habitats for wildlife. Residents should be encouraged to view the species recommendations and principles set out within the Urban Tree Planting Strategy and the Pollinator Strategy. Resident interventions could also utilise raised planters, permeable paving and small-scale water features within their own private street-facing spaces. Larger areas of grass verge should be sown with wildflowers to connect with the St Davids pollinator trail, for example along Bryn Road and Brynteg.

Figure 11.3: STD2



Benefits of the project

11.7 Benefits of the project, as depicted in Figure 11.4 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Investment & enhanced visitor experience
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion
- Reinforces a sense of place

- Urban cooling
- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 11.4: Benefits



Delivery mechanisms

11.8 The introduction of wildflower meadows, once established, could reduce the time requirements for grass cutting during the growing season. Annual cuts of meadows could be integrated into the existing works programme of the Pembrokeshire County Council (PCC) Street Care / Amenity Maintenance Team.

11.9 The delivery of interventions such as tree planting should be done in collaboration with local residents and could be tied into a community tree planting day. By allowing residents to have a say in what species they would like to see outside their homes, and where they would like them planted, it would encourage greater stewardship of the specimens through and beyond the establishment period. The design of tree pits, the depth and soil used and the on-going watering and maintenance is vital in ensuring successful establishment.

11.10 Where possible, trees and planting material should be sourced locally.

11.11 Planting practices should follow the delivery guidance set out within the Urban Tree Planting Strategy and the Pollinator Strategy.

11.12 Through these community engagement activities, information could be distributed which educates residents on what more they could be doing in their own private spaces, including front and back gardens.

Potential partners

- PCC StreetCare Amenity Maintenance Team
- Tree Wardens Pembrokeshire
- EcoDewi
- The Bug Farm
- St Davids City Council
- Wild About Pembrokeshire

Outline cost

Low cost = <£250k

11.13 Costs would be scalable depending on the number of interventions. Ongoing maintenance and establishment should be factored into costings.

11.14 The cost of creating a meadow depends on the size and scale of the site and the options for seeding available. For small areas, it's relatively cost effective to establish a small wildflower meadow. The cost of seed (lowland meadow perennial mixes) to cover 50 sq m ranges from £20-£30.

11.15 The cost of trees would vary depending on the size of the tree required and the species, however, planting into soft landscapes would be considerably cheaper than planting into hard surfaces.

Potential funding opportunities

- Community fundraising
- Local Places for Nature Fund
- Pembrokeshire Coast National Park Authority (PCNPA)
- National Lottery Community Fund
- Business sponsorships

Timescale

Quick win = <1 year

11.16 Interventions could be implemented pretty quickly, providing they are carried out at the correct time of the year e.g. bare-root tree planting season runs from October to March. Successful interventions can be replicated and repeated as and when funding comes available, or community appetite grows.

Potential constraints

11.17 There may be local objection to the project if enhancements detract from the tidy and orderly appearance of the street. Signage and interpretation boards could help to mitigate against this, however, interventions must be clearly communicated to local residents prior to installation.

11.18 This project would require the community to get on board to ensure interventions are popular, both on public and private land. Community

engagement with the project is essential for the ongoing stewardship of new plantings, particularly new tree planting within the 60 month establishment phase.

11.19 Initial establishment would require additional resources from the PCC StreetCare / Amenity Maintenance Team. However, once meadows are established and trees become independent in the landscape, interventions should reduce management time requirements.

Maintenance and stewardship

11.20 The PCC StreetCare / Amenity Maintenance Team should be ultimately responsible for the establishment of meadows and trees located on public land. However, engaging the community and allowing them to take ownership of the projects would increase the likelihood of long term stewardship, particularly relating to tree watering, inspecting stakes and reporting any issues.

Monitoring for success

11.21 Survival rate of new planting and area of meadow habitats established can be monitoring indicators for success. An annual community BioBlitz could be organised to record the variety of life within areas of intervention. Engaging with citizen science projects such as the UK Pollinator Monitoring Scheme or organising an annual community BioBlitz at certain greenspaces can help involve local communities in monitoring efforts.

Next steps

11.22 Review the delivery section of the Pembrokeshire Pollinator Strategy and Urban Tree Planting Strategy to review options for enhancing the biodiversity value of greenspaces.

11.23 Engage with the PCC StreetCare / Amenity Maintenance Team to determine which sites could be managed differently and how.

11.24 Engage with St Davids City Council and residents.

Figure 11.5: St Davids



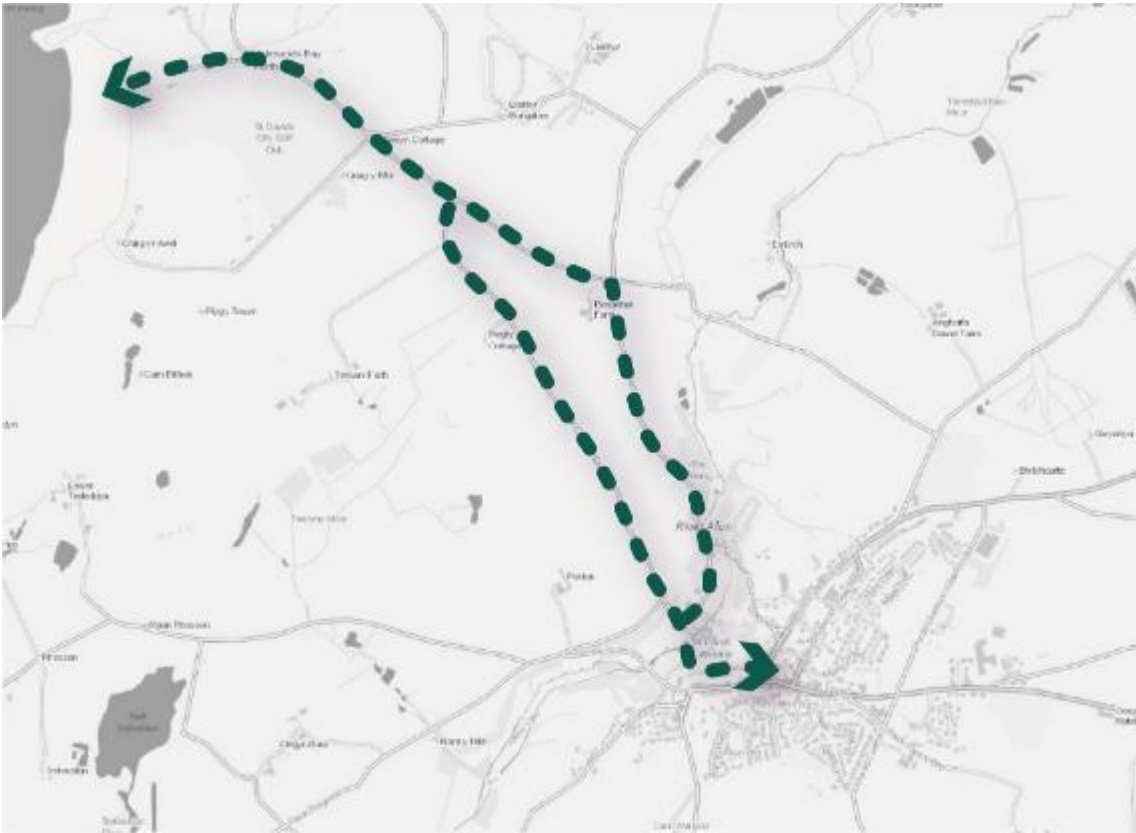
STD4 – Provide an active travel link to Whitesands Bay

11.25 Whitesands Bay is a popular beach with both visitors and residents. As a consequence, the B4583 can form a busy corridor during the busy summer period. Opportunities to create a safe and direct cycle and walking link between

St Davids and Whitesands (an approximate 10 minute cycle and 40 minute walk) should be explored. The route could make use of existing minor lanes and prioritise them for pedestrians and cyclists, for example, either Feidr Chwech-Erw or Pen Rhiw (which currently accommodates National Cycle Network (NCN) 4) could be designated as quiet lanes where vehicle speeds are restricted to 20mph or they are used for access only. The creation of an off-road stretch along the B4583 would create a safe route between St Davids and the beach. This would require further exploration and engagement with landowners to determine how the path could be segregated from the road and may require some land take.

11.26 The route to Whitesands would form part of the initial step in making St Davids better connected to the Pembrokeshire Coast Path and creating circular coastal walks for visitors and residents to enjoy to the north, south, east and west of the city. This could be coupled with a new range of signage and street furniture to help people orientate themselves around the St Davids Peninsula on foot and bike, as well as interpreting some of the nationally significant biodiversity and heritage assets.

Figure 11.6: STD4



Benefits of the project

11.27 Benefits of the project, as depicted in Figure 11.7 below, include:

- Provides active travel opportunities
- Investment & enhanced visitor experience
- Play, education and interaction with nature
- Enhances air quality & noise regulation
- Social interaction and community cohesion
- Improves health and wellbeing

Figure 11.7: Benefits



Delivery mechanisms

11.28 A grant application would be required to secure funding for the capital works associated with this project. The route would need to be identified on the Integrated Network Map to be considered eligible for funding.

Potential partners

- Active Travel team, forming part of the Transport Strategy Unit at Pembrokeshire County Council (PCC)
- St Davids City Council
- Pembrokeshire Coast National Park Authority (PCNPA)
- Relevant landowners

Outline cost

High cost = <£1 million

11.29 Costs to transform either Feidr Chwech-Erw or Pen Rhiw into quiet lanes would be relatively small, providing access or speed cameras are not installed.

Capital works for a section of off-road path along the B4583 would require a substantial capital investment.

Potential funding opportunities

- Welsh Government Active Travel Fund Grant
- PCC
- Transport for Wales

Timescale

Long term = >5 years

11.30 Timescales would likely be long due to the need to gather traction behind the project, liaise with key stakeholders and landowners, undertake surveys, raise funding and undertake the capital works.

Potential constraints

11.31 The project would likely be complex due to a number of competing demands and constraints. Much of this would come from the issue of requiring significant external funding and buy-in from local landowners. Part of the route would require landowner buy-in if off-road sections are to be delivered, for example along the B4583, or Compulsory Purchase Orders could be explored.

11.32 Should an off-road solution be agreed upon, localised vegetation clearance would be needed, although this should be kept to a minimum and routes should closely hug the existing carriageway as much as possible. The project would require an ecological assessment in order to inform route optioneering. Any construction work would need to be undertaken outside of the

bird nesting season and in liaison with an ecologist or an Ecological Clerk of Works (ECoW).

11.33 Sections along the B4583 should ideally be segregated from the road as the route could be unsafe for cyclists and pedestrians during the busy summer peaks. This can be exacerbated by inappropriate parking.

11.34 Some parts of the route are quite steep and therefore it would not be accessible for all users.

11.35 In order to fulfil the criteria of the Welsh Government Active Travel Fund Grant, the scheme design must ensure it is consistent with the principles of the Active Travel (Wales) Act 2013 and the supporting Active Travel Act Guidance. Schemes that include highway improvement, construction, or traffic management must show how they comply in particular with Section 9 of the Act (Provision for walkers and cyclists in the exercise of certain functions).

Maintenance and stewardship

11.36 Ongoing annual maintenance of any hard surfacing along the route would be needed, including any vegetation clearance to keep the route accessible. Sightlines should always be retained across the entire route.

Monitoring for success

11.37 The opportunity exists to install sensors or counters to monitor the usage of the route as part of the wider active travel network within the county. This approach would help measure the success of the substantial investment and inform the long-term strategy and delivery of similar projects in the future.

Next steps

11.38 Undertake a feasibility study and optioneering exercise to determine the proposed route.

11.39 Develop a street furniture and signage strategy for the route which could be rolled out across St Davids and its surrounding area.

11.40 Comprehensive engagement with the community and landowners should be undertaken to gauge appetite for the project.

11.41 Close engagement with specific landowners likely to be affected by the route should take place prior to any public announcements.

11.42 An ecological assessment should be undertaken to examine any likely impacts of vegetation clearance needed to support the route.

Figure 11.8: St Davids



STD15 – Create wetlands adjacent to St Davids Wastewater Treatment Works

11.43 The conversion of vacant land adjacent to St Davids Wastewater Treatment Works to wetland would act as a buffer for sewage outfall in periods of high volume. Wetland habitat would create new habitat for wildlife and aid nutrient stripping of the outfall. This would help to alleviate the nutrient load currently discharged into the Pembroke Marine Special Area of Conservation (SAC) downstream in Porthclais which is an ongoing problem. In 2021, over 1,573 hours of combined storm overflows (where untreated foul effluent is discharged to the river due to the capacity of the infrastructure being exceeded) occurred at the St Davids Sewage Pumping Station. This intervention would

help to store floodwater as well as improve water quality, reduce flood risk and decrease the risk of siltation of adjacent waterbodies.

Figure 11.9: STD15



Benefits of the project

11.44 Benefits of the project, as depicted in Figure 11.10 below, include:

- Reduces the risk of flooding
- Enhances water quality
- Space for wildlife and ecological resilience
- Carbon sequestration & climate mitigation

Figure 11.10: Benefits



Delivery of nature-based solutions and ecosystem services

11.45 Wetlands can aid flood alleviation, acting as a store of excess water in periods of heavy rainfall in addition to their primary function of nutrient stripping and cycling. These habitats also provide multiple biodiversity benefits.

11.46 Constructed wetlands, if designed correctly, can achieve sustainable effluent treatment that provides a reduction in contaminant concentration similar to more complex chemical-based or mechanical mechanisms. The effluent from sewage treatment facilities is typically rich in nutrients and wetlands can be used to help alleviate this issue in sensitive areas such as the Pembrokeshire Marine SAC.

Delivery mechanisms

11.47 The cooperation and involvement of Dwr Cymru Welsh Water would be critical to the success of this project, and hence the first stage would be to engage with them and to draw together a feasibility study, looking at the required throughflow rates, the space available and the options associated with wetland design.

11.48 An appropriate design engineer should be consulted to provide a design of the wetlands. The potential area for the wetlands should be calculated and agreed with relevant landowners. Consultation with the local community should be undertaken to enable engagement with the plans. Contractors required to scope out the topography and excavate selected areas should be employed. Consideration of materials needed to create the wetlands such as substrate materials and vegetation should also be sourced as locally as possible.

11.49 Citizen science and combined storm overflow monitoring should be utilised to help inform and monitor the project. Although scientific studies are outside the scope of this phase of works, any information obtained by citizen science relating to the health of the local marine environment would also be welcomed to support this project. An ecological assessment of potential sites should be undertaken prior to selection.

Potential partners

- Wildlife Trust of South and West Wales
- Natural Resources Wales (NRW)
- West Wales Rivers Trust
- Pembrokeshire Coastal Forum
- Dwr Cymru Welsh Water
- Cardigan Bay Marine Wildlife Group

Outline cost

Low to medium cost = <£250k to £1 million

11.50 Costs would comprise land purchase or rent, specialist engineer design of the wetlands, procurement of planting and costs associated with excavation and installation of the wetlands.

Potential funding opportunities

- Dwr Cymru Welsh Water
- The Four Rivers for LIFE project
- Nutrient credits using Section 106 agreement
- National Lottery Community Fund
- Ofwat Innovation Fund

Timescale

Medium-term = 1-5 years

11.51 This anticipated programme length includes for time to enable the design of the wetland, agreements with landowners, construction and planting of the wetland.

Potential constraints

11.52 A key constraint for the project would be securing landowner agreements. It would also be essential to ensure the wetlands are located adjacent to the sewage treatment infrastructure to avoid re-routing sewage outfalls that would increase time and costs of the project. Antibiotic-resistant bacteria accumulation in wetlands is a concern and should be considered in the design of the wetlands.

11.53 The wetland would need to be sensitively designed due to the spatial constraints of the site.

11.54 An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Maintenance and stewardship

11.55 Wetlands are fairly low maintenance with little to no running costs as they do not require power and are generally reliable self-adjusting systems. However, maintenance would be required a few times a year to remove debris from any outlets, replace any damaged pipes, remove any invasive plant species that may be outcompeting the wetland plants, reduce sediment accumulation and check the structural integrity of the structural aspects of the design. Ongoing agreements with Dwr Cymru Welsh Water or landholders for access would be crucial.

Monitoring for success

11.56 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science. Techniques could include monitoring of water quality using simple hand-held equipment or installation of a simple stream-gauge to monitor streamflow. Engagement with Dwr Cymru Welsh Water to create a monitoring system to assess nutrient sequestration and combined storm overflow incidents / spill time should also be explored.

Next steps

11.57 Dwr Cymru Welsh Water's collaboration would be critical to ensure the success of this project, and so the first step would be to enter into discussion with Dwr Cymru Welsh Water and sign up to a collaboration agreement. This may also enable access to funding for the project, either with Dwr Cymru Welsh Water or as part of the Ofwat Innovation Fund.

11.58 Engage with landowners to enter into agreements to purchase or rent their land. Engage with the local community to create support and 'buy-in' for the project.

Project Long List

STD1 - Deliver a new community growing space / allotments on Glasfryn Road

11.59 In order to meet the high demand for allotments within St Davids, the opportunity exists to utilise the remaining undeveloped field on Glasfryn Road as a community growing space. The site could be managed as a community garden in partnership with Ysgol Penrhyn Dewi School. There are good opportunities for access via active travel routes and additional habitat enhancements, including the introduction of field margins, pollinator corridors, ponds, hedgerows and ditches.

STD2 - Introduce urban greening within existing residential areas

11.60 Refer to Kickstarter Projects.

STD3 - Enhance connections with the Pembrokeshire Coast Path

11.61 The provision of wayfinding and the condition of path surfacing on existing PRoWs between Pen-y-Garn and St Non's should be improved. The opportunity also exists to enhance wayfinding and the local promotion of the

existing cycle route between Bryn Road and Goat Street as a safe cycle link between St Non's and St Davids (4 minute cycle). Consideration should be given to the installation of electric bicycle charging stations at locations along the route. The use of Fford Porth Clais as a safe and direct cycle route down to Porthclais Harbour (5 minute cycle, 20 minute walk) should also be supported. Wayfinding signage should be clear and include distances and walking / cycling times.

STD4 - Provide an active travel link to Whitesands Bay

11.62 Refer to Kickstarter Projects.

STD5 - Improve sensitive access to North West Pembrokeshire Commons SAC and Dowrog Common

11.63 An off-road cycle route, with wayfinding and signage should be implemented towards the south western arm of Dowrog Common (at Waun Fawr). A circular route around the perimeter of this open access land up to the lane at Mynydd Du should also be established and promoted. As a European protected heathland habitat, the proposals should incorporate sensitive path upgrades and educational signage to ensure dogs are kept on leads and that activities which increase the risk of wildfires are restricted.

STD6 - Enhance the setting of St Davids Cathedral and the Bishop's Palace for pollinators

11.64 The grounds of both St Davids Cathedral and the Bishop's Palace are characterised by close mown verges which could be enhanced for pollinators through relaxed mowing regimes and sowing wildflower seeds. Consideration should also be given to the establishment of wildflower meadows on steeply sided slopes which are inaccessible to mowers. Furthermore, quieter areas around the grounds offer the potential for the introduction of undisturbed areas for log piles.

STD7 - Develop pollinator provision at Oriel y Parc Gallery and Visitor Centre

11.65 Existing banks could be enhanced to provide bare earth areas for pollinators and butterfly banks. The enhancement of these areas would create a high value habitat for pollinators at all life stages, including providing larval food sources. A number of banks and vegetation topped dry stone walls within the adjacent car park could also be enhanced to provide a greater variety of flowering plants. This area also forms the start of the pollinator trail and further enhancement would strengthen the bee friendly status of the area.

STD8 - Enhance the habitat potential of sports pitches at Ysgol Penrhyn Dewi

11.66 The potential exists to implement tree planting around the perimeter of the site to enhance habitat connectivity, particularly along the A487. Tree planting at the edges of pitches should also be explored to provide additional shade and structure to the grounds. In addition, the sowing of wildflower seed,

appropriate ground preparation and the relaxation of mowing regimes should aim to create 'wilder' areas for pollinators at field margins.

STD9 - Enrich existing habitat at Merivale Car Park / Bishop's Palace

11.67 The existing habitat at this location should be conserved and enhanced for pollinators through the implementation of additional planting, relaxed mowing regimes and woodland edge management. Existing areas of standing water should also be enhanced to incorporate hoverfly lagoons.

STD10 - Address gaps in St Davids Pollinator Trail

11.68 The pollinator trail for which St Davids is granted 'Bee Friendly' status has degraded since its accreditation and the opportunity exists to rejuvenate the network of raised planters. In order to re-achieve this status, The Meadow, Quality Cottages and Wild About Pembrokeshire should be enhanced through works to upgrade the planters with flowering, pollinator-friendly perennials.

STD11 - Enhance the greening of Nun Street

11.69 The grass bank at the turning between Nun Street and Mount Gardens offers the opportunity for the establishment of tree groups. Further along Nun Street where the gradient of the grass verge increases, the area should be sown with wildflower meadow to create additional pollinator habitat and increase aesthetic interest. The establishment of additional street trees should also be explored at the hard surfacing separating the carriageway and the parking bays near the junction with New Street.

STD12 - Locally promote community food growing opportunities

11.70 Dewi's Acre Community Garden provides an exemplar of how wildlife friendly gardening can support biodiversity and deliver opportunities for community food growing. This space should continue to be managed and locally promoted for the benefit of wildlife and the community.

STD13 - Introduce a network of street trees on New Street and the A487 High Street

11.71 Explore the opportunity to introduce a network of robust street trees within the public realm on New Street and the A487 High Street. Due to spatial constraints, options could include the use of trees at the entrance to the street to frame views as well as the use of fastigate canopy forms to maintain good visibility and ensure sufficient height clearance for pedestrians.

STD14 - Create wetlands adjacent to St Davids Wastewater Treatment Works

11.72 Refer to Kickstarter Projects.

STD15 - Deliver floodplain reconnection and tree planting

11.73 Natural Resources Wales (NRW) has identified multiple areas upstream of St Davids along the River Alun, where there is a potential to connect historical areas of floodplain to the current river channel. These works would

aim to provide floodwater storage and reduce flood risk downstream. Furthermore, the potential exists to combine the floodplain reconnection with areas of tree planting to enhance flood alleviation. Tree planting should also be used in areas of un-wooded floodplain as a mechanism to help attenuate rainfall and reduce flood risk, whilst providing valuable habitat for wildlife.

STD16 - Create a pedestrian link connecting St Davids and Porthclais adjacent the River Alun

11.74 Work with local landowners to establish a strategic pedestrian route linking the open access area at Pit Street with Porth Clais, via the corridor of the River Alun. The route offers the potential to link up with existing sections of the Public Rights of Way (PRoW) network, including a bridleway crossing the River Alun at Lower Moor. The corridor would offer recreational value and provide wider linkages with the Pembrokeshire Coast Path.

STD17 - Develop a network of circular walks on land surrounding Bishops Palace

11.75 Explore opportunities for the creation of circular walks which dissect the area of open access land to the south west of Bishop's Palace, crossing the corridor of the River Alun and form wider linkages with Merry Vale. The potential also exists to utilise the area of woodland to the north of Bishop's Palace to re-establish woodland paths for local recreational benefits..

Chapter 12

Tenby

Figure 12.1: Tenby



A Portrait of Tenby's Green Infrastructure

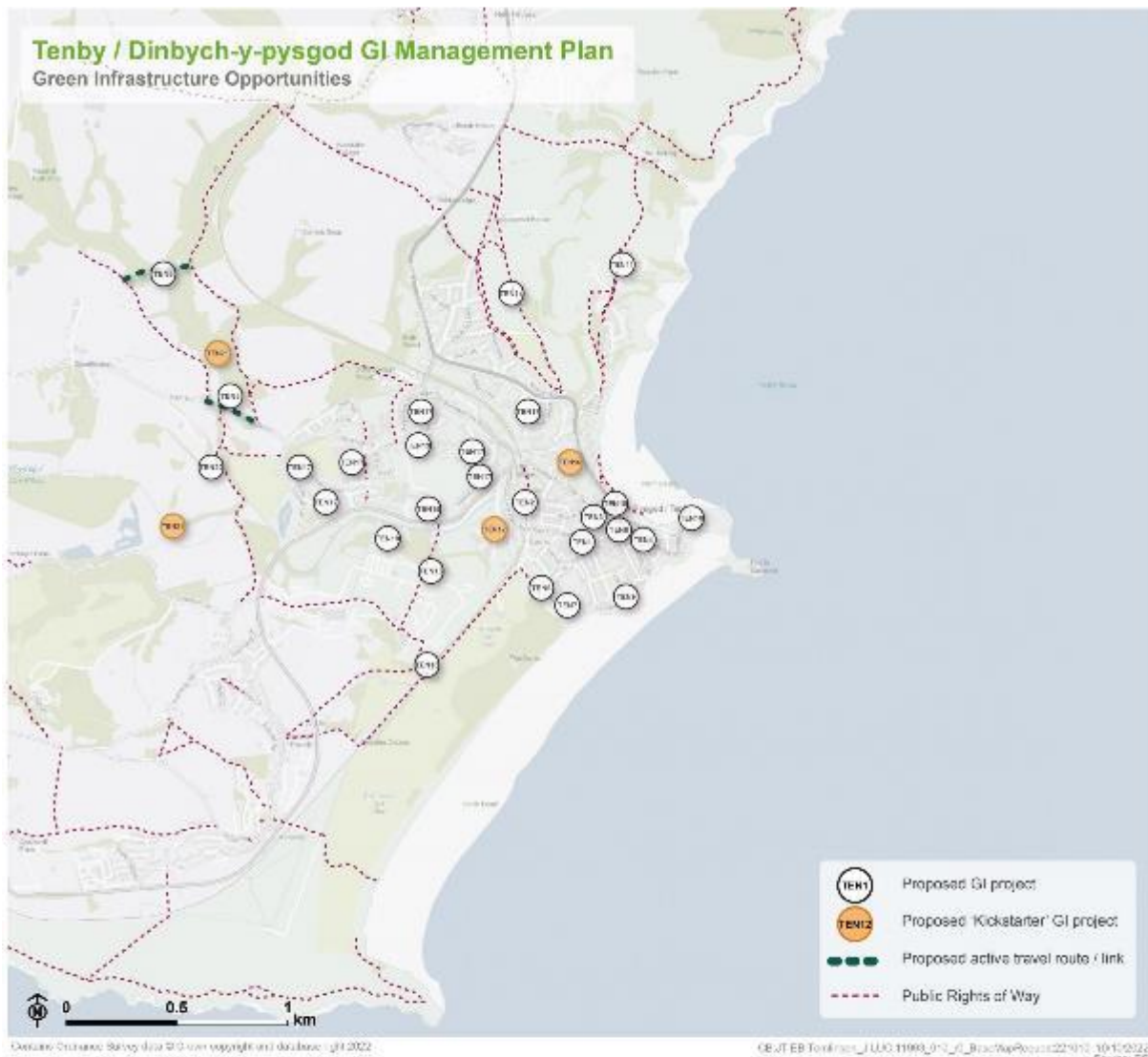
12.1 Tenby is a medieval walled town on the south Pembrokeshire coast. Built along the clifftop and surrounded by sandy beaches, the town is a popular

tourist destination. The ancient Tenby Town Walls encircle the historic core which are designated as a Conservation Area. The historic core's narrow streets, interlinking alleyways and numerous listed buildings help the town to retain a distinctly maritime character. The 12th century Tenby Castle and the 19th century fort-topped St Catherine's Island provide distinct elements in Tenby's seascape character. Tenby is located within the Pembrokeshire Coast National Park.

12.2 Although much of the town's coastline is urbanised, Tenby is home to multiple public beaches that border the town to the north and south. This popular stretch of coastline is also home to the Pembrokeshire Coast Path National Trail which connects Tenby with the wider Pembrokeshire Coast National Park landscape. Generally, other public open spaces within Tenby are located to the west of the town centre, with green space in the densely settled historic core largely being limited to St Mary's churchyard. South-west of the town centre, the Ritec River and its broad low-lying floodplain flow in an easterly direction toward the sea. This marshy waterway offers additional areas of recreation opportunity due to a number of public rights of way (PRoW). Belts of ancient woodland and Ritec Fen, which is designated as a Site of Special Scientific Interest (SSSI), make this valley an important wildlife corridor. Tenby's marine environment is internationally and nationally recognised through its designation under the Bristol Channel Approaches Special Area of Conservation (SAC), Carmarthen Bay and Estuaries SAC, Carmarthen Bay Special Protection Area (SPA), Tenby Cliffs and St Catherine's Island SSSI, and Lydstep Head to Tenby Burrows SSSI. Overall, tree cover within the settlement core is limited, with much of the woodland located at the town edges, or along the railway and river corridors.

12.3 Tenby has strong transport and recreation links to the wider region through its rail station, promoted walking routes and cycle links. Footpath links connect Tenby with the wider countryside in the north, south and west, as well as the Pembrokeshire Coast Path. National Cycle Network (NCN) 4 also passes through the town and makes use of off-road lanes and coastal paths to the north and south.

Figure 12.2: GI Opportunities within Tenby



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| TEN1 Promote greening of the Transport Hub | TEN2 Enhance the setting of Tenby Station | TEN3 Deliver greening interventions at the Town Wall |
| TEN4 Promote greening of the High Street and St Julian's Street | TEN5 Introduce a circular walk to Scotsborough House | TEN6 Enhance the Battery Gardens for pollinators |
| TEN7 Encourage the establishment of pollinator-friendly flowering plants at Jubilee Gardens | TEN8 Increase biodiversity at St Mary's Church | TEN9 Introduce native planting along the Esplanade |
| TEN10 Provide a pollinator haven at Tenby Castle | TEN11 Enhance and promote Allen's View | TEN12 Strengthen strategic green linkages at land lying between the Sallem's Industrial Estate and the River Rizec |
| TEN13 Promote active travel mechanisms and safe routes to schools | TEN14 Enhance wayfinding and surfacing of NCN | TEN15 Create a pollinator bank at Ysgol Greenhill School |
| TEN16 Deliver a growing space at St Telins Primary School | TEN17 Introduce tree planting within residential areas | TEN18 Promote the urban greening of key routes |
| TEN19 Introduce a pond, scrapes and Sustainable Drainage Systems (SuDS) infrastructure by The Marshes | TEN20 Create wetland areas by the Tenby Wastewater Treatment Works | TEN21 Reconnect the floodplain and riparian environment on river banks |
| TEN22 Promote community food growing in Tenby | | |

Kickstarter Projects

TEN12 – Strengthen strategic green linkages at land lying between the Salterns Industrial Estate and the River Ritec

12.4 Land lying between The Salterns and Lower Park Road / Quarry Road currently hosts a mosaic of wet grassland, tree and marshland habitat. The land, which is owned by Pembrokeshire County Council (PCC), is bounded by the River Ritec to the east and forms an important north to south connection between the wooded railway corridor, Tenby Golf Club and woodland at the dunes, with strategic areas of greenspace around Ysgol Greenhill School, Marsh Road and Heywood Lane. At present, the space is largely unmanaged and offers the potential to create a more diverse mosaic of riparian habitat. Opportunities for sensitive access to the riverside to support local interactions with nature, informal paths and naturalistic play features could also be explored. Habitat features, such as log piles and invertebrate houses, should also be introduced to provide additional opportunities for nature exploration.

12.5 The site sits within an area of high flood risk, with the green space, surrounding industrial units at Salterns Industrial Estate and some adjacent housing falling within Flood Zone 3. The creation of additional wetland scrapes, appropriate tree planting and the use of natural flood storage areas should be considered as a nature-based solution to flooding. The strategic location of the space means it could be delivered in partnership with surrounding businesses, residents and schools. Furthermore, the space provides an opportunity to enhance a key active travel link between the town centre and train station. Clear sightlines should be retained into and out of the space for informal surveillance, as well as from adjoining properties.

Figure 12.3: TEN12



Benefits of the project

12.6 Benefits of the project, as depicted in Figure 12.4 below, include:

- Reduces the risk of flooding
- Provides active travel opportunities
- Enhances water quality
- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Improves health and wellbeing

Figure 12.4: Benefits



Delivery mechanisms

12.7 Significant initial effort is required to get the space into a state of positive management, most likely in collaboration with the PCC StreetCare / Amenity Maintenance Team, community groups or other conservation groups such as The Wildlife Trust. Ongoing management of the site should then be incorporated into annual maintenance programmes.

12.8 When planting new trees, ongoing care and management should be delivered for the 60 month establishment phase after planting to ensure their successful independence within the landscape. This should include watering during dry seasons, loosening tree stakes and regular checking for wind throw.

12.9 Part of the scheme, for example tree planting and any wildlife or bulb areas, could be delivered through the Growing Urban Greenspaces 2022 – 2023 programme.

Potential partners

- PCC StreetCare / Amenity Maintenance Team
- The Wildlife Trust of South and West Wales
- Pembrokeshire Nature Partnership

- Tree wardens Pembrokeshire
- Tenby Town Council
- Tenby Green Space Preservation Society
- Local schools
- Local businesses

Outline cost

Low cost = <£250k

12.10 Depending on the degree of community involvement in initial management pushes and ongoing maintenance, the project would be relatively cost effective long-term. The introduction of informal paths, seating and natural play features would present a capital cost if these were pursued.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund
- Nature Networks Fund
- Growing Urban Greenspaces 2022 – 2023 programme

Timescale

Quick win = <1 year

12.11 Initial efforts to get the green space into a state of positive management could be delivered relatively rapidly. However, the continued positive management of the space would be required for its lifetime.

Potential constraints

12.12 The location of the site and the limited degree of natural surveillance presents the risk of antisocial behaviour. By opening up sightlines and views across the River Ritec from neighbouring properties, this may be reduced.

12.13 Ongoing maintenance of the space to ensure the habitat mosaic is retained would require ongoing resource inputs each year. This may be difficult for the PCC StreetCare / Amenity Maintenance Team to incorporate into their management programme without additional support from volunteers.

12.14 Perceptions of 'wild' spaces can be that they're untidy or messy. Signage to communicate the importance of leaving spaces to nature can be used to increase education and understanding.

Maintenance and stewardship

12.15 Ongoing annual maintenance of the space would be needed throughout different seasons. Any new tree planting would need regular care for the 60 month establishment phase following planting. This should include watering during the drier summer months, loosening stakes as they grow, checking the trees and guards for damage following strong winds.

12.16 Regular control and cut back of invasive and dominant species would be required, for example brambles and Himalayan balsam. This can be quite labour intensive but could be picked up by volunteer teams.

12.17 Use of fertilisers, pesticides and insecticides should be avoided, particularly in proximity to the watercourse.

Monitoring for success

12.18 A Citizen Science scheme could be used to monitor the success of the new wildlife space, for example, through invertebrate counting days or monitoring water quality of the River Ritec.

Next steps

12.19 Undertake a Phase 1 habitat / ecological survey of the existing habitat at the space.

12.20 Liaise with the PCC StreetCare / Amenity Maintenance Team to discuss management options and the degree to which community or conservation group support would be needed.

Figure 12.5: Tenby



TEN16 – Deliver a growing space at St Telio’s Primary School

12.21 Work with St Telio’s RC Primary School to provide a community orchard and growing space in the area of amenity grass to the north of the school at St. John’s Hill. The introduction of orchard trees within the space would support pollinators and other wildlife, whilst also providing direct ‘tree to plate’ sources of fruit. Blossoms during the spring and shade during the summer would also help to create a more playful and functional space. Vegetable beds, raised containers, planters and vertical climbers offer the opportunity to provide a diverse selection of fruits and vegetables for year-round growing and consumption.

12.22 Additional habitat features such as bug hotels, log piles, bird boxes and areas of meadow establishment would provide additional opportunities for ecological education and interactions with nature. The establishment of the growing facility also offers the potential to work in partnership with the school to integrate sustainable food growth as part of the curriculum. Working in accordance with the objectives of the Pollinator Strategy for the town, the role spaces these spaces can play in providing wildlife refuge through habitat creation and ecological management practices should also be explored, whilst ensuring sufficient space is retained for outdoor learning and play space.

Figure 12.6: TEN16



Benefits of the project

12.23 Benefits of the project, as depicted in Figure 12.7 below, include:

- Space for wildlife and ecological resilience
- Play, education and interaction with nature
- Social interaction and community cohesion
- Improves health and wellbeing

Figure 12.7: Benefits



Delivery mechanisms

12.24 Delivery would need to be achieved in partnership with St Telio's RC Primary School. Much of the initial establishment works could be completed in partnership with the school, including tree planting and building items such as invertebrate hotels. Some horticultural and landscape management advice may be required from Pembrokeshire County Council (PCC) to oversee this. Ongoing growing and maintenance could largely be undertaken by the school with some support from the PCC StreetCare / Amenity Maintenance Teams.

Potential partners

- St Telio's RC Primary School
- PCC StreetCare / Amenity Maintenance Teams
- Tenby volunteer tree warden (Tree Wardens Pembrokeshire)

- Pembrokeshire Nature Partnership
- Tenby Town Council
- Tenby Green Space Preservation Society
- Incredible Edible Network
- Groundwork UK
- Wales Biodiversity Partnership
- The Federation of City Farms and Community Gardens – Community Land Advisory Service in Wales and the Growing Together project
- Wild About Pembrokeshire

Outline cost

Low cost = <£250k

12.25 Interventions can be fairly simplistic and low cost. Establishment and management should be factored into costings.

Potential funding opportunities

- Local Places for Nature Fund
- National Lottery Community Fund
- Developer contributions

Timescale

Quick-term = 1-5 years

12.26 The project will likely take a year or two to get on the ground due to the need for engagement and fundraising.

Potential constraints

12.27 The project requires buy-in from the school as it will be a significant, yet rewarding, asset to take on. Securing appropriate investment for the growing space would be crucial for its successful delivery. Furthermore, sufficient resource to help in the initial establishment and ongoing maintenance will be essential for the continued success of the growing space, particularly those with some horticultural and landscape management knowledge.

12.28 Appropriate ground preparation and soil testing will be needed prior to delivery.

Maintenance and stewardship

12.29 The project will rely on the ongoing stewardship of the growing space to primarily lie with the school. This could be incorporated into existing maintenance regimes, as well as through outdoor learning and hands-on activities for the children. Additional support from the PCC StreetCare / Amenity Maintenance Teams should be provided to ensure the ongoing success of the space, both horticulturally and for wildlife.

Monitoring for success

12.30 The site could be included within PCC's Wellbeing Plan. Overview measures of the children's response to the growing space could be measured, for example, time spent outdoors, knowledge around where food comes from, willingness to try new fruits and vegetables, understanding of pollinators and the importance of biodiversity etc.

Next steps

12.31 Consult with St Telio's RC Primary School to judge appetite for the project.

12.32 Engage with the PCC StreetCare / Amenity Maintenance Teams.

12.33 Undertake soil testing on the site to ensure the space would be suitable for growing edible items.

Figure 12.8: Tenby



TEN21 – Reconnect the floodplain and riparian environment on river banks

12.34 Situated within Flood Zone 3, land adjacent to the River Ritec is at risk from coastal surges and fluvial flooding. The opportunity exists to reconnect floodplain and riparian environments, restoring arable farmland along the riverbank back to its natural state.

12.35 Reconnecting the floodplain, planting trees and increasing the network of riparian habitat along the banks of Knightston Brook and River Ritec would help to reduce future surface water flooding in the area, helping to build climate resilience. Furthermore, the conversion of arable farmland into wetland habitat would further increase the biodiversity value of the area as well as provide

- Improves health and wellbeing
- Carbon sequestration & climate mitigation

Figure 12.10: Benefits



Delivery of nature-based solutions and ecosystem services

12.37 Population growth and demand for housing has resulted in the alteration of many floodplains across the UK into residential, commercial or agricultural land uses. Much of the floodplain of the River Ritec in Tenby has been converted to arable land, with a decline in tree cover and drainage of the land to maximise the efficiency of the farmland. This has resulted in a reduction of habitats and a loss of wetlands and associated wet terrestrial habitats. However, flood risk has increased. The landscape is now able to absorb much less rainwater and so offers less capacity to slow and reduce the volume of water flowing down rivers – the landscape, therefore, provides a reduced buffer in prolonged rainfall events. Reduction of wetland habitat and riparian environments also results in a reduction in carbon sequestration within the area.

12.38 The reintroduction of wetland and riparian habitats creates a store for excess surface run-off, reducing flood risk, and increasing water quality and on site carbon sequestration. Re-wetting of wetland soils would also increase their capacity to absorb and lock-in carbon. Reconnecting floodplains creates vital

habitats for species such as waterfowl and juvenile fish breeding grounds, contributing to the wider biodiversity of the area

Delivery mechanisms

12.39 Selected sites adjacent to the River Ritec and Knightston Brook would need to be identified and scoped out for their suitability. An ecological assessment of each site would be required. This scoping and assessment could be conducted by trained citizen scientists, Pembrokeshire County Council (PCC) staff or trained consultants. It would be necessary to engage with landowners and land occupiers / graziers in order to present this opportunity and discuss their impacts on current land-use.

12.40 We envisage the proposed physical interventions and amendments to land management could be delivered by the landowners themselves, or by external agricultural contractors.

Potential partners

- Landholders
- PLANED – Pembrokeshire Sustainable Agriculture Network (PSAN)
- Tenby Green Space Preservation Society
- Wildlife Trust of South and West Wales
- Natural Resources Wales (NRW)

Outline cost

Low cost = <£250k

12.41 Costs would comprise some limited specialist advice and land agent fees, soft landscape and tree planting costs. The construction of wetland scrapes would require contractors and machinery. An ecological assessment of the site would need to be undertaken by an ecologist with all site works potentially supervised by an Ecological Clerk of Works (ECoW).

Potential funding opportunities

- Pembrokeshire Coast National Park Authority (PCNPA)
- Emerging Welsh Government Sustainable Farming Scheme
- Resilient Communities Grant Programme
- Local Places for Nature Fund
- The Tree Council
- National Forest for Wales – The Woodland Investment Grant (National Lottery Heritage Fund – Round 1)
- NRW grants
- Nature Networks Fund

Timescale

Medium-term = 1-5 years

12.42 The main constraint to the programme for this project would be gaining landowner agreement. This could be a protracted process, but if concluded

quickly then the implementation could be relatively rapid. A programme would need to allow for time to undertake hydrological modelling of the catchment and to obtain the necessary licences and permits to undertake the works. Physical interventions could be delivered within a single summer season, depending on contractor availability.

12.43 A key unknown for the project would be the time required to gain landowner / occupier / grazier agreements / consents.

Potential constraints

12.44 A key constraint for the project would be landowner / occupier / grazier agreements, as there may be a perceived risk to farm viability associated with some loss of land to riparian environments and wetland habitats. These concerns should be countered with the availability of agricultural payments for environmental goods and services, and hence the delayed launch of the Welsh Government's Sustainable Farming Scheme is a potential constraint in this regard.

Maintenance and stewardship

12.45 Maintenance of the softworks and wetland area would be required as part of the 60 month establishment phase, including the replacement of failed trees.

Monitoring for success

12.46 Subject to availability of funding, monitoring of the success of the project should be undertaken through simple citizen science, with suitable support.

Next steps

12.47 Consult with PCC and NRW to identify if the project could align with the Strategic Outline Case for the River Ritec project which has been awarded funding from the Welsh Government.

12.48 Engage with landowners / occupiers / graziers and enter into agreements to deliver interventions on their land. Investigate the potential for nutrient credits to offset project costs.

Figure 12.11: Tenby



Project Long List

TEN1 - Promote greening of the Transport Hub

12.49 Enhance greening of the multi-storey car park with a cable supported green wall (including steel ropes, mesh and climbing plants) to provide space for invertebrates and birds, as well as trapping exhaust fumes. Bus stops should also be improved through the use of raised planters and retrofitting with green roofs, whilst ensuring proposals do not impede access for the mobility impaired. Where space permits, the lifting of slabs to deliver rain gardens could also be achieved. Furthermore, bulb and plug planting beneath trees should be explored in the area of amenity grass next to the bus stop, as well as additional pollinator-friendly planting within the Tenby War Memorial Garden.

TEN2 - Enhance the setting of Tenby Station

12.50 Introduce urban greening features at the entrance of Tenby Station to create a more welcoming gateway. Re-configure existing parking provision by the entrance to create raised planters, street tree planting and a secure cycle parking shelter with green roof. Improvements to wayfinding and signage should promote linkages to the town centre, Tenby Castle, Castle Beach and Tenby Harbour along Warren Street, as well as Tenby South Beach along Station Road. Proposals should also look to incorporate an active travel route connecting The Green with Tenby Station. Working with residents along Warren Street, locations for the planting of small street trees could also be identified.

TEN3 - Deliver greening interventions at the Town Wall

12.51 South Parade once hosted a row of chestnut trees which were diseased and removed over safety concerns. A replacement green corridor which introduces linear rain gardens in the original extent of the former tree pits should be installed. Designs should not affect the stability of the wall or screen views of the heritage asset. Flowering perennials, small shrubs and tree species would all provide an attractive and rich pollinator corridor. A review of other planting along South Parade and St Florence Parade should also be undertaken to create a plan for the renovation of shrub planting.

TEN4 - Promote greening of the High Street and St Julian's Street

12.52 Explore options to reconfigure the junction between High Street, Church Street and St Julian's Street to reclaim some car parking provision for tree and shrub planting. At present, the semi-pedestrianised space is cluttered with street furniture, including large numbers of bollards, benches and signage. The opportunity exists to remove some parking spaces (whilst retaining spaces for disabled, loading and 20 minute spots) on St Julian's Street to allow for the introduction of parklets, raised planters, cafe spill out and sociable seating areas.

TEN5 - Introduce a circular walk to Scotsborough House

12.53 The ruins of the 17th century Scotsborough House is a Scheduled Monument and sits within an area of tranquil ancient woodland to the west of Tenby. An existing PRow connects Tenby to this heritage asset from

Scotsborough View and Serpentine Road. The opportunity exists to improve wayfinding provision as well as the creation of a recreational PRow link between the two footpaths which run parallel to the wooded stream valleys.

TEN6 - Enhance the Battery Gardens for pollinators

12.54 The Battery Gardens currently provide a valuable number of pollinator-friendly flowering plants. However, this would be further enhanced through replacement of some ornamental species with native pollinator-friendly plants and the introduction of wildflower meadow at the perimeter of the park where strips of amenity grassland are present.

TEN7 - Encourage the establishment of pollinator-friendly flowering plants at Jubilee Gardens

12.55 The play park and skate park in Jubilee Gardens are currently bounded by steep grassy verges or rocky faces. Reducing the frequency of mowing at these locations and the addition of salt-tolerant plug plants would improve the attractiveness of the park, without compromising its recreation function. This would also provide important pollinator connectivity.

TEN8 - Increase biodiversity at St Mary's Church

12.56 St Mary's Church provides a number of opportunities to provide additional pollinator habitat within the centre of Tenby's old town. The potential exists for volunteers / local groups to help with the planting of flowers, creation of

deadwood piles and earthbanks. Churches often provide opportunity for all life cycles of pollinators and although the space is located within the heart of Tenby, it benefits from minimal disturbance.

TEN9 - Introduce native planting along the Esplanade

12.57 Pockets of ornamental plants currently exist at The Esplanade, specifically at the Atlantic Beach Gardens. This should be enhanced to include increased native flowering species. The siting of additional planters throughout the town centre offers the opportunity to provide more suitable pollinator habitat. Enhancements along The Esplanade would also complement similar initiatives taking place along the old Town Wall.

TEN10 - Provide a pollinator haven at Tenby Castle

12.58 Working in conjunction with Pembrokeshire County Council (PCC) Amenity Maintenance Teams, the extension of wildflower meadows and earth banks for pollinators at Castle Hill and Tenby Castle should be used to enhance the provision of pollinator habitat. Sightlines should be retained at this location for informal surveillance.

TEN11 - Enhance and promote Allen's View

12.59 Working with Tenby Civic Society, introduce management practices which diversity the woodland ground flora at this wooded hilltop viewpoint. Consider the introduction of wayfinding to promote the public space from the Pembrokeshire Coast Path and support wider proposals to deliver an active travel connection from The Croft to North Beach Car Park.

TEN12 - Strengthen strategic green linkages at land lying between the Salterns Industrial Estate and the River Ritec

12.60 Refer to Kickstarter Projects.

TEN13 - Promote active travel mechanisms and safe routes to schools

12.61 Explore the opportunity to utilise the Welsh Government's Safe Routes in Communities programme and Active Travel funding to introduce greening interventions as part of active travel schemes within the town, notably along Heywood Lane.

TEN14 - Enhance wayfinding and surfacing of NCN

12.62 Explore the opportunity to re-surface NCN route 4 as it passes Tenby Cemetery to increase the accessibility of the route to cyclists. The route lies within close proximity to the proposed development site at Bryn Hir and would provide a key active travel link to the town centre. Wayfinding between the town centre, Bryn Hir and the holiday park at New Hedges should also be improved. Alternative proposals should consider the installation of an active travel route linking Slippery Back with North Beach Car Park and onwards towards Tenby via The Croft.

TEN15 - Create a pollinator bank at Ysgol Greenhill School

12.63 Work in partnership with Ysgol Greenhill School to explore opportunities for a pollinator bank to the south of the main campus adjoining Marsh Road. Using the area to the west of the existing footpath offers the opportunity to create an undisturbed area for establishment of a wildflower meadow. The potential also exists for additional boundary tree planting along Heywood Lane on the north of the campus. This would complement the existing mature trees within the playing fields.

TEN16 - Deliver a growing space at St Telio's Primary School

12.64 Refer to Kickstarter Projects.

TEN17 - Introduce tree planting within residential areas

12.65 Work with communities to identify areas of amenity grass within residential areas which are suitable for tree planting. Encourage community ownership of these trees to secure their long-term establishment e.g. watering, loosening stakes and mulching. To enhance the sense of community ownership, residents should be involved in the selection of species and planting. Suitable streets include Heywood Court, Rosemount Gardens, Newell Hill, The Gleve, Churchill Close and Tudor Way.

TEN18 - Promote the urban greening of key routes

12.66 Support the use of sympathetic design principles to introduce urban greening measures within spatially constrained spaces, such as around St. Mary's Church and Upper Frog Street. In addition, explore the opportunity to strengthen key strategic green linkages, including the proposed active travel route from Penally into Tenby.

TEN19 - Introduce a pond, scrapes and Sustainable Drainage Systems (SuDS) infrastructure by The Marshes

12.67 This area is at a high risk of flooding and has been heavily flooded in the past. The creation a series of ponds and scrapes in the area would help improve biodiversity as well as act to potentially retain excess flood water during surge events.

TEN20 - Create wetland areas by the Tenby Wastewater Treatment Works

12.68 The Tenby Wastewater Treatment Works currently manages wastewater from both Tenby and Saundersfoot. Creation of a wetland on land adjacent to the works would serve to store floodwater and reduce flood risk downstream. The wetland habitat would act as a buffer for sewage outfall in periods of high volume and aid nutrient stripping. The intervention would also help to alleviate the discharge of nutrient loading further downstream.

TEN21 - Reconnect the floodplain and riparian environment on river banks

12.69 Refer to Kickstarter Projects.

TEN22 - Promote community food growing in Tenby

12.70 The opportunity exists to work with Pembrokeshire County Council to select an appropriate site to increase allotment provision within the town. The intervention should encourage plot owners to reduce the use of pesticides and herbicides, instead choosing to work the land organically. Additional tree and orchard planting opportunities should also be explored. Where possible, planting margins should be left uncut, sheds fitted with living roofs and bird feeders added to attract wildlife.

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