



ECOSYSTEMS ENHANCEMENT PROGRAMME

TLP INTRODUCTION

07/07/2017





TIDAL LAGOON POWER

Who are we?

- **Our mission** - to drive a critical change in the UK's energy mix by developing infrastructure that harnesses the inherent natural power from the rise and fall of the coastal tides.
- **Our vision** - to pioneer a large-scale source of indigenous, low carbon electricity that is reliable, affordable and sustainable long-term.
- **Our business** - the creation of sustainable low carbon renewable energy.
- **Our ethos** - to promote sustainable environmental, economic and social improvement for the communities in which we work, contributing to improving the wellbeing of the local people.



CLIMATE CHANGE TARGETS

UK's Ambitious Climate Targets

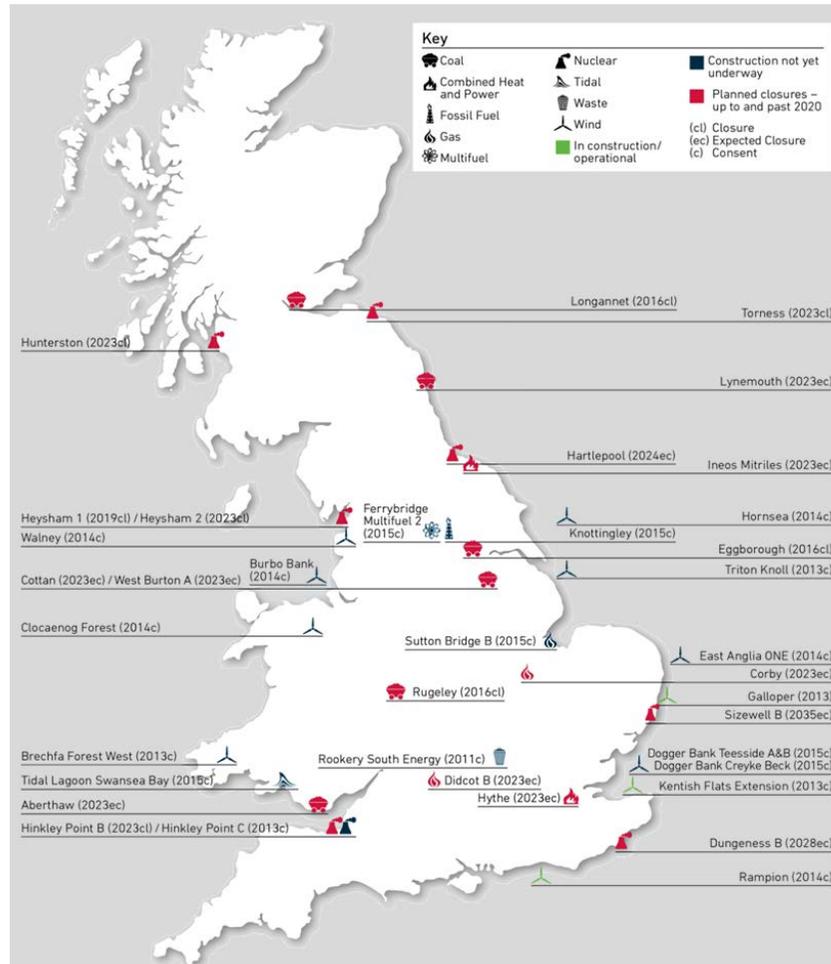
- The 2015 Climate Change Treaty requires new technologies to replace old; part of an 80% reduction in CO₂ emissions by 2050
- Paris Climate Agreement – signed – 22 April 2016, effective – 4 November 2016
- United Nations Framework Convention on Climate Change (UNFCCC)
- Members promised to reduce their carbon output “as soon as possible” and to do their best to keep global warming “to well below 2 degrees C”



Paris Climate Agreement, 2016



THE UK ENERGY GAP



Source: Bircham Dyson Bell LLP, 'The Energy Crunch', 2016

- Security of supply is imperative
- UK peak winter electricity load is approx. 57GW of power
- Approx 20GW of capacity due to be lost over 10 years
- Power stations set to be de-commissioned due carbon emissions legislation and assets
- Capital requirements to replace these ageing power stations £100bn
- Nuclear programme not running at the pace to address the shortfalls



HENDRY REVIEW

Conclusions

- **Tidal lagoons are cost competitive with offshore wind and new nuclear**
- **Tidal lagoons can contribute towards the UK's security of supply**
- **Tidal lagoons can contribute towards the UK's decarbonisation targets**
- **A programme of tidal lagoons could achieve significant cost reductions**
- **Tidal lagoon supply chain opportunities are real and substantial**



TIDAL LAGOON SWANSEA BAY

Wall length:	9.5km
Area:	11.5km ²
Rated capacity (@4.5m head):	240MW
Installed capacity:	320MW
Daily generating time:	14 hours
Annual output (net):	495GWh
Annual CO ₂ savings:	236,000 t
Asset life:	120yrs
Height of wall:	5-20m
Wall above low water:	12m (max)
Wall above high water:	3.5m (max)
Tidal range Neaps:	4.1m
Tidal range Springs:	8.5m



Tide comes in, but is held back 2.5 hours. Tide goes back out and is held back 2.5 hours. A fully flushing system, mimicking nature.

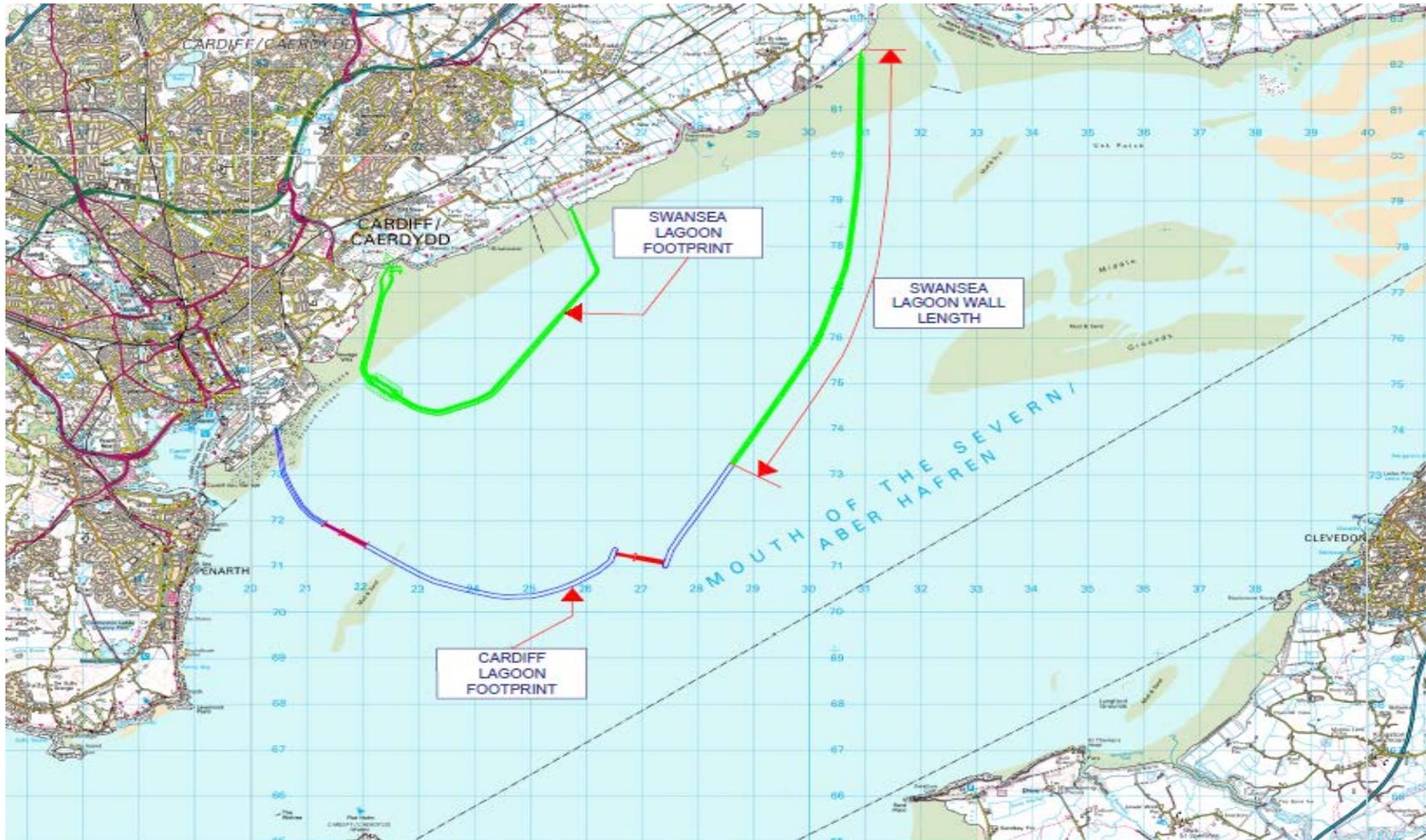


ADAPTIVE ENVIRONMENTAL MANAGEMENT PLAN

- Provides a framework for monitoring and mitigation
- Detailed surveys and monitoring to be carried out throughout the life of the lagoon
- Continuously updated and evaluated
- Evidence-led



SCALING UP



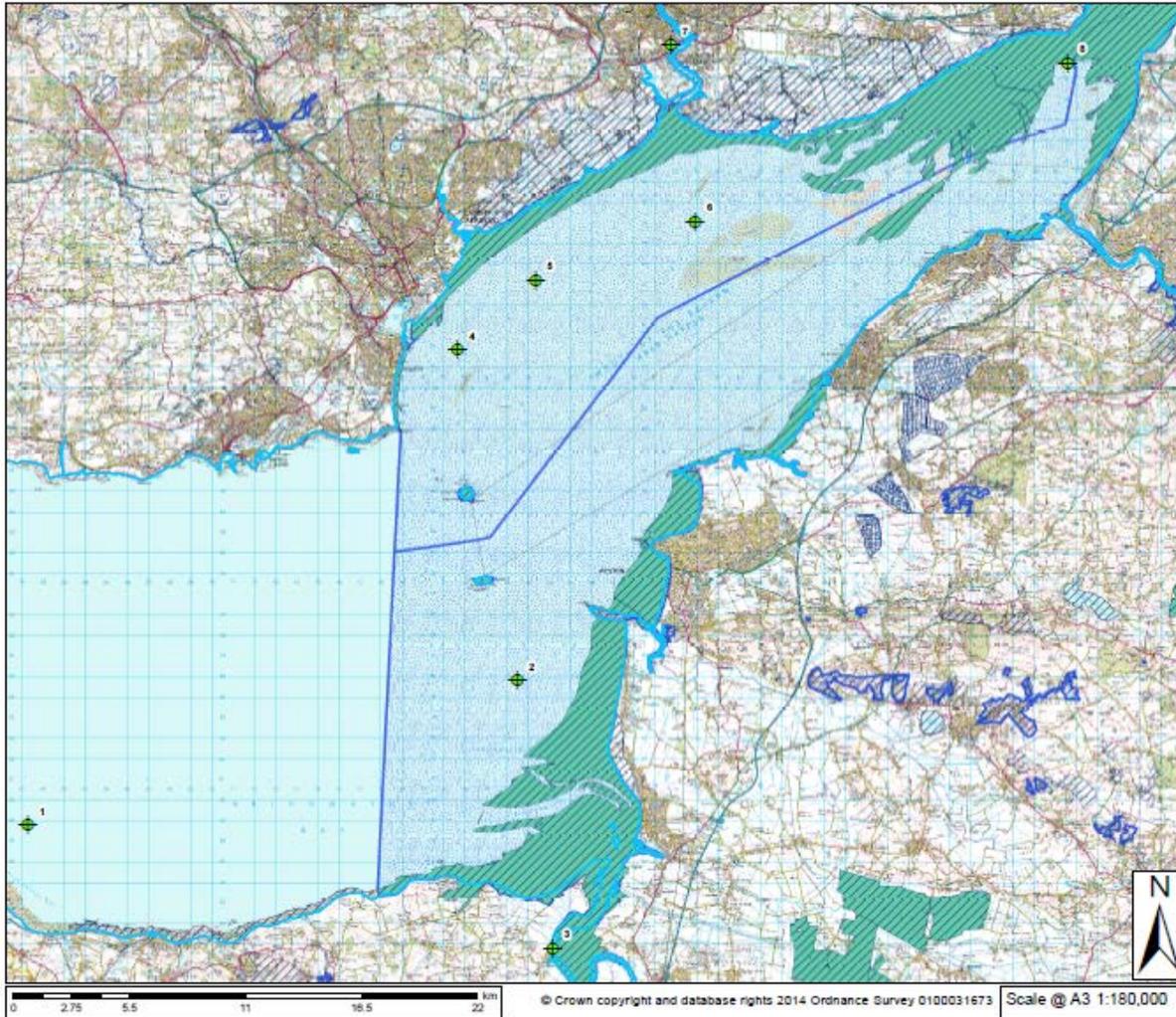
EIA SURVEY WORK

For a range of purposes

- Sediment / windblown sand
- Water quality
- Ecological – e.g. saltmarsh
- Hydroacoustic
- Plankton trawls
- Intertidal / subtidal fish surveys
- Fish tagging – salmon / sea trout (adults and smolts)
- Fish tagging – eel
- Birds / invertebrates/ reptiles
- Noise
- Vegetation



ENVIRONMENTAL CHALLENGE



Deployment Site
Mean High Water
SSSI
SPA
SAC

SEVERN ESTUARY
ENVIRONMENTAL DESIGNATIONS

MARINE LICENCE SAMPLE LOCATIONS

Date DEC 2014	Drawn By SC
Drawing No. TLP-141201-B	Issue 1

TIDAL LAGOON
POWER



THE ECOSYSTEM ENHANCEMENT PROGRAMME

To have enhanced biodiversity, through a targeted nature conservation programme alongside the generation of large-scale clean energy by 2030

The EEP has three central aims:

1. To have a net positive effect on biodiversity (that is, to go beyond the avoidance of impacts or the achievement of a neutral outcome alone).
2. To address the compensation and ecosystem scale mitigation requirements TLP anticipate will arise from tidal lagoon development.
3. To foster innovative and collaborative partnerships to deliver conservation action in the UK, EU and globally.



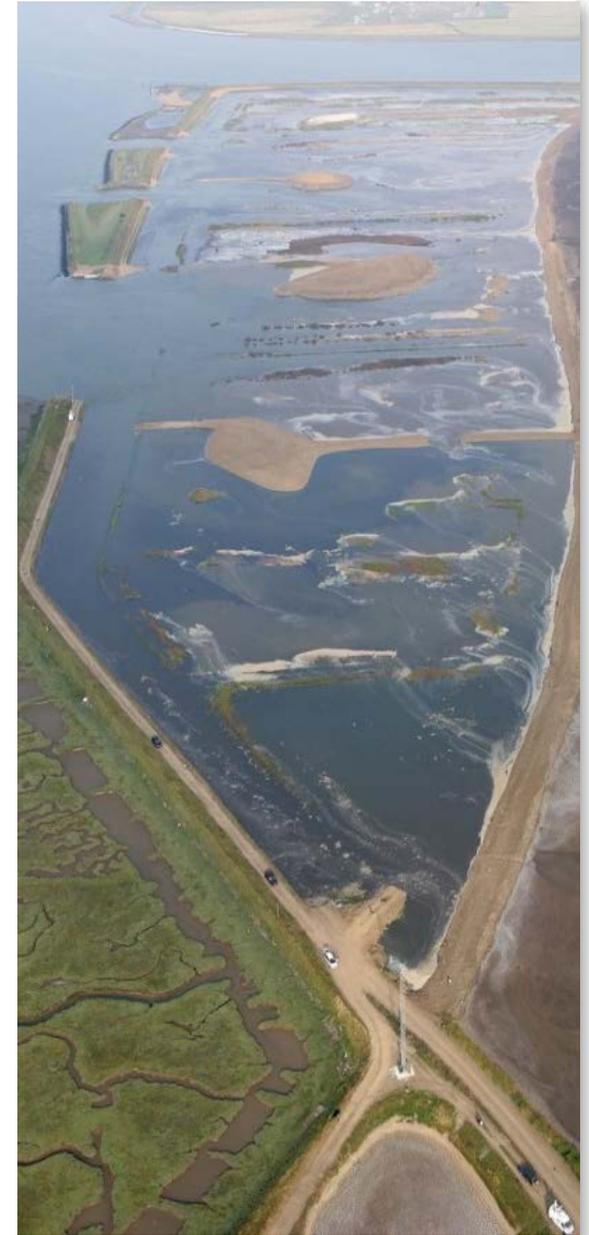
PROJECTS

Wetland habitat: designed and consented wetland habitat sites, demonstrating viability at the point of DCO application for the first large scale lagoon. Work under way includes stakeholder engagement, engineering concepts, modelling, EIA survey scoping and other feasibility studies.

Migratory fish and river habitat: designed and consented measures to improve the migration, spawning and escapement for key fish species potentially affected by lagoon development. Includes catchment to coast and land management initiatives.

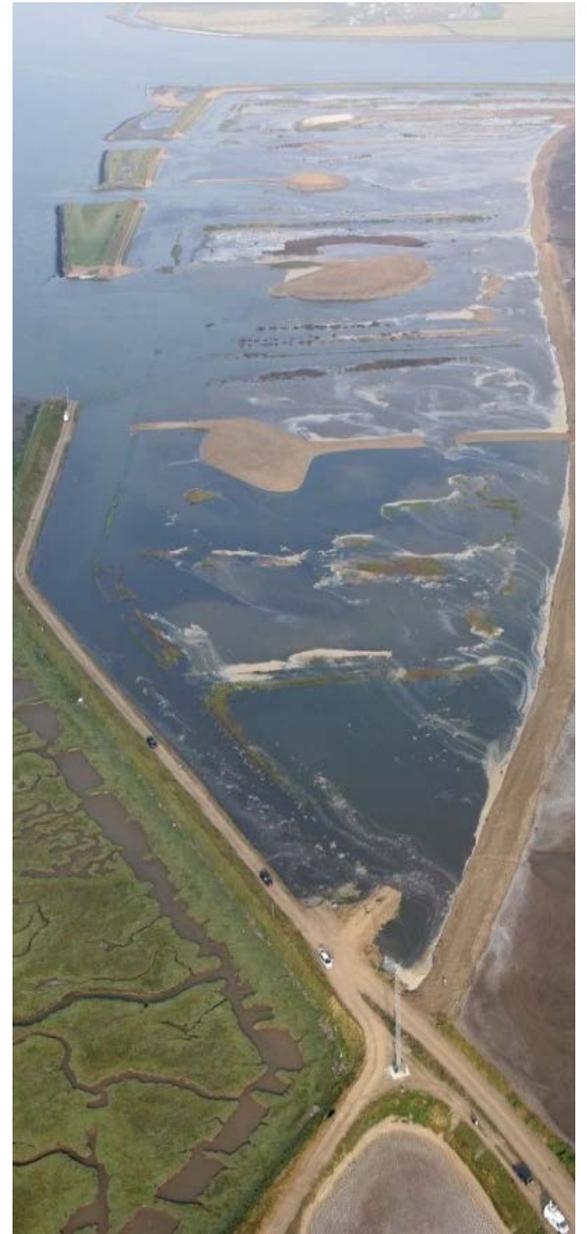
Subtidal habitat: designation or impact mitigation measures to compensate for potential impacts on subtidal habitat. Possible replacement designation of subtidal habitat or measures to reduce existing pressures on habitat within the immediate zone.

Enhancement measures: opportunities to improve and conserve biodiversity without direct link to lagoon impacts. Targeted local enhancement at main project sites and European-scale biodiversity conservation.



WETLANDS TO SUPPORT CTL

- **Current priority sites**
 - 12 sites amounting to 2,011ha of land
 - Landowner negotiations underway
 - Ecological and engineering studies completed at a number of sites
 - Concept scheme designs for 4 sites
- **Secondary sites**
 - 3,000 ha of land
 - 7 sites
 - All with potential to be deliverable for TLC.
- **Future sites**
 - 15+ sites amounting to 10,000ha
 - For future lagoons



CATCHMENT INITIATIVES

Migratory fish & river habitat

Some example measures include:

- Removal of barriers to migration or installation of fish passes & by-pass channels
- Creation of fish spawning habitat (e.g. re-introduce riffle-pool sequence)
- Natural Flood Management (NFM)
- Land management changes (e.g. planting riparian buffer zones for diffuse agri run-off to improve water quality)
- Habitat measures for specific species' recovery (e.g. tidal gate modifications & eel)
- R&D programmes that demonstrably support/link to species' recovery



Weir removal



Fish Pass Installation



Riparian fencing



NET POSITIVE / ENHANCEMENTS

- International and functionally linked initiatives, e.g. at key flyway sites
- Wader breeding programme away from project zone of influence
- Targeted enhancement initiatives for IUCN Red List Species / UK Biodiversity Action Plan (BAP) priority species e.g. flower rich transitional areas for Shrilc carder bees
- Research and development; trialling new solutions and approaches to biodiversity enhancement in the coastal zone e.g. biogenic reefs and floating islands
- Rewilding initiatives; ecosystems scale thinking, indirect linkages to lagoons
- Gwynedd CC reserves management funding
- Citizen science, education, tourism, heritage and other initiatives



A PRECEDENT

Stearth Marshes: a partnership project between the Environment Agency and WWT

Objectives:

- Coastal squeeze compensation: By 2025 an estimated 497ha of existing Severn Estuary intertidal habitat is predicted to have been lost .
- Securing the future of the peninsula and its people: Providing long-term sustainable flood defences on what is an incredibly mobile coastline.

Achievements:

- Construction May 2012 and breach September 2014.
- 473ha site including 300ha of saltmarsh.
- 60ha rain-fed wetland providing natural flood storage to prevent flooding downstream.
- £20m overall project cost (£42k/ha), £8m land purchase (£17k/ha)
- Species success: record numbers of knot, dunlin and lapwing. In 2015, the site had breeding avocet, only the second time this has been seen in Somerset for over 170 years!



MIGRATORY FISH: UNLOCKING THE SEVERN

A partnership project between the Severn Rivers Trust, Canal & River Trust, EA and Natural England

Project objectives:

1. To open up 200km+ of historic spawning grounds for Twaite shad
 2. Construction of 5 vertical slot fish passes on the River Severn and removal of 2 weirs of the River Teme
 3. Provide climate change resilience - the Severn Estuary is currently the northerly point for this species.
 4. Achieve favourable status for twaite shad in the Severn Estuary SAC.
- The largest project of its kind ever attempted in Europe.
 - £19.4m funding from EU LIFE Nature programme and HLF.
 - Work to start in 2017 and will take approximately 5 years to complete.
 - Will also benefit allis shad, salmon, coarse fish, eels and lamprey.
 - Includes the installation of a viewing gallery at Diglis fish pass to allow people to watch fish undertaking migration.



Thank you/Diolch

