The Moors at Arne Project

Stakeholder Liaison Group
Meeting 4
12 June 2019

rspb giving nature a home

Environment Agency

NATURAL ENGLAND

Stakeholder Liaison Group

Agenda

1	Introductions	5 mins
2	Review of notes from last meeting	5 mins
3	Brief project update and discussion	10 mins
4	Lagoons	15 mins
5	Siltation	15 mins
6	Update on public access and traffic	10 mins
7	Open Forum	30 mins
8	Next steps and date of next meeting	5 mins

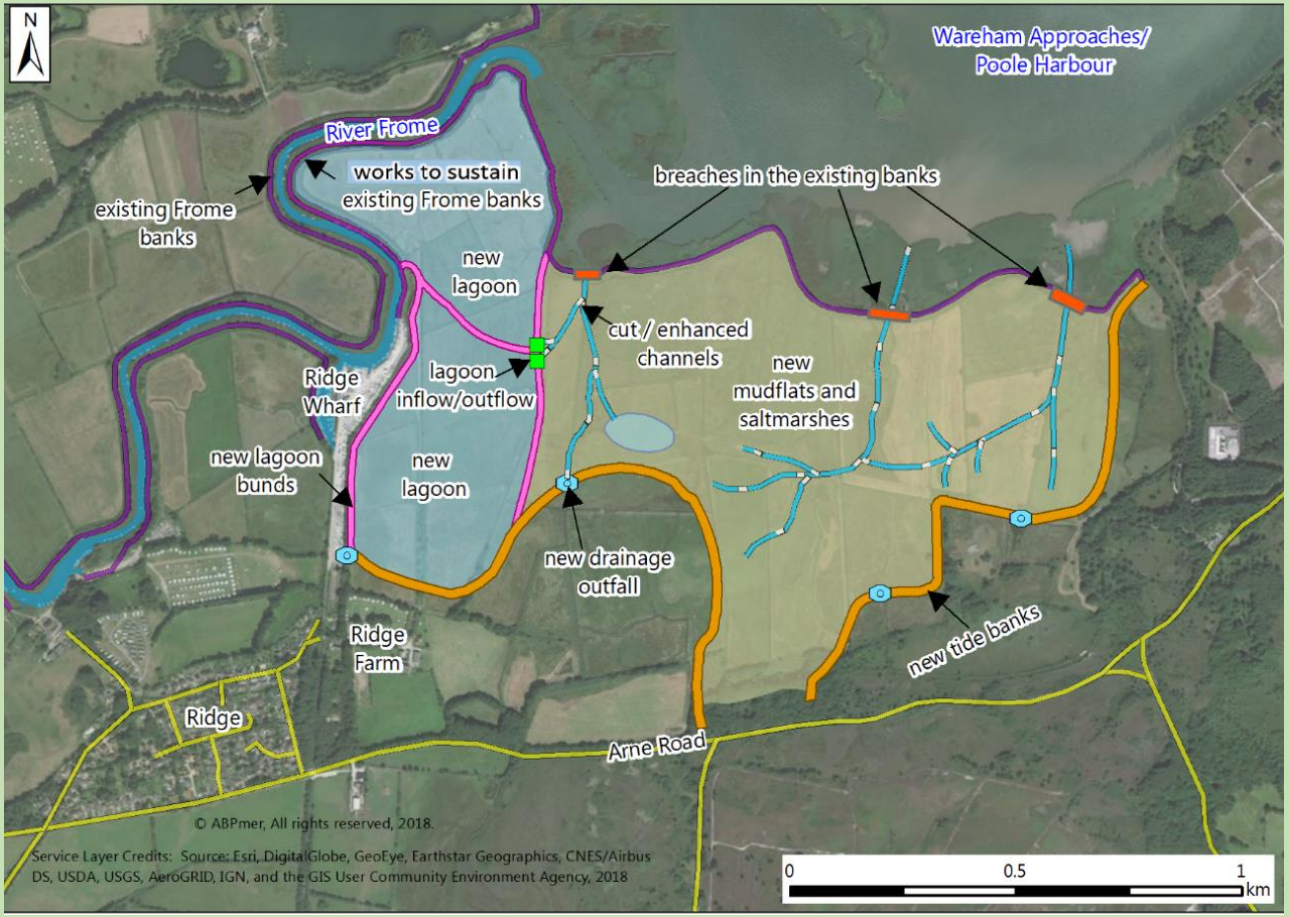
Brief Project Update

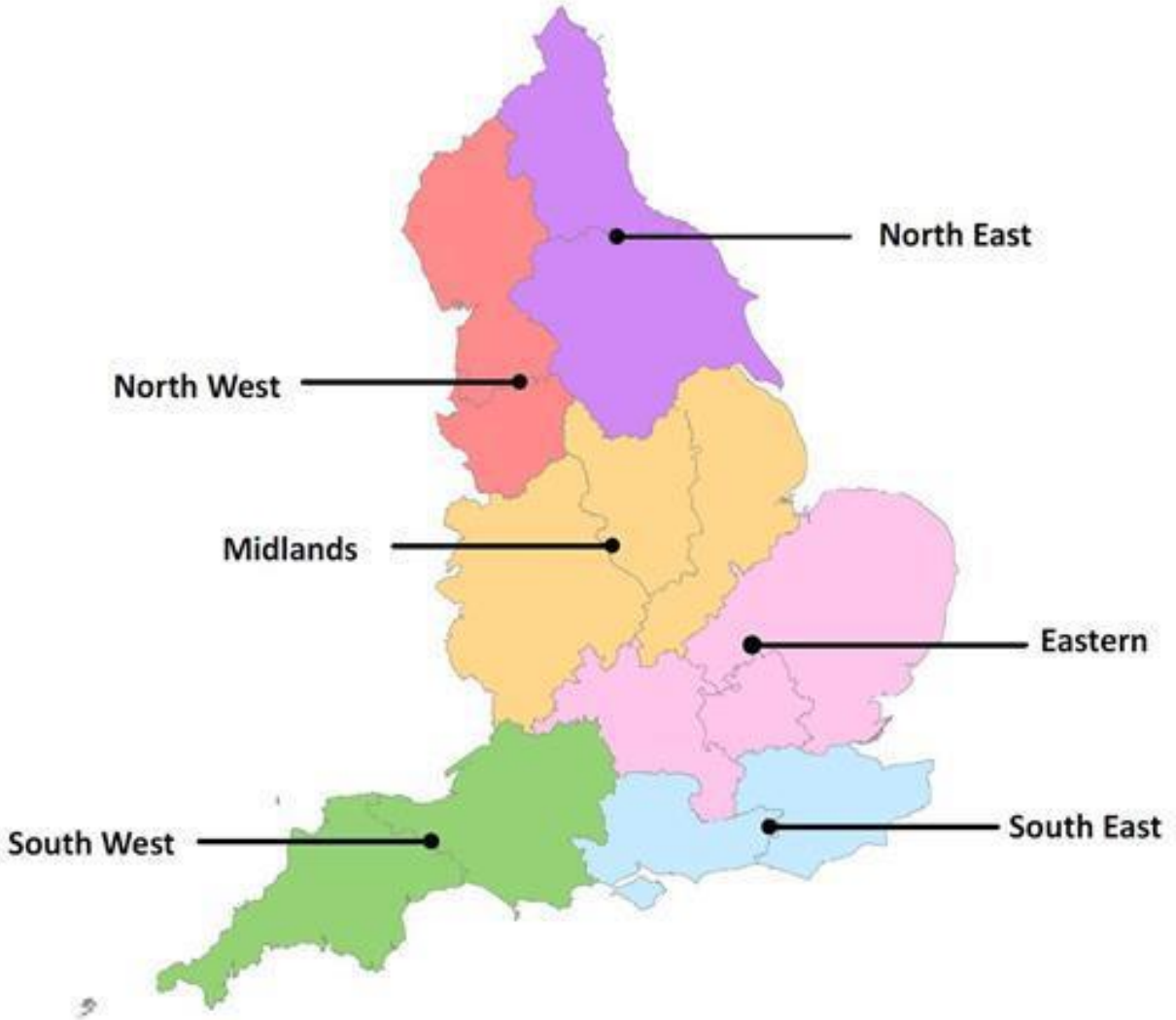
Ongoing work:

1. Continued monitoring of ground and surface water levels
2. Flood Risk Assessment ongoing
3. Appointment of detailed design consultant and contractor team

Brief Project Update

No changes to bank alignments.





North East Hub

Lot 1: Ove Arup & Partners Ltd

Lot 2: BAM Nuttall Ltd

North West Hub

Lot 1: Jacobs UK Ltd

Lot 2: VolkerStevin Ltd

Midlands Hub

Lot 1: Ove Arup & Partners Ltd

Lot 2: Jackson Civil Engineering Group Ltd

Eastern Hub

Lot 1: Jacobs UK Ltd

Lot 2: BAM Nuttall Ltd

South West Hub

Lot 1: Atkins Ltd

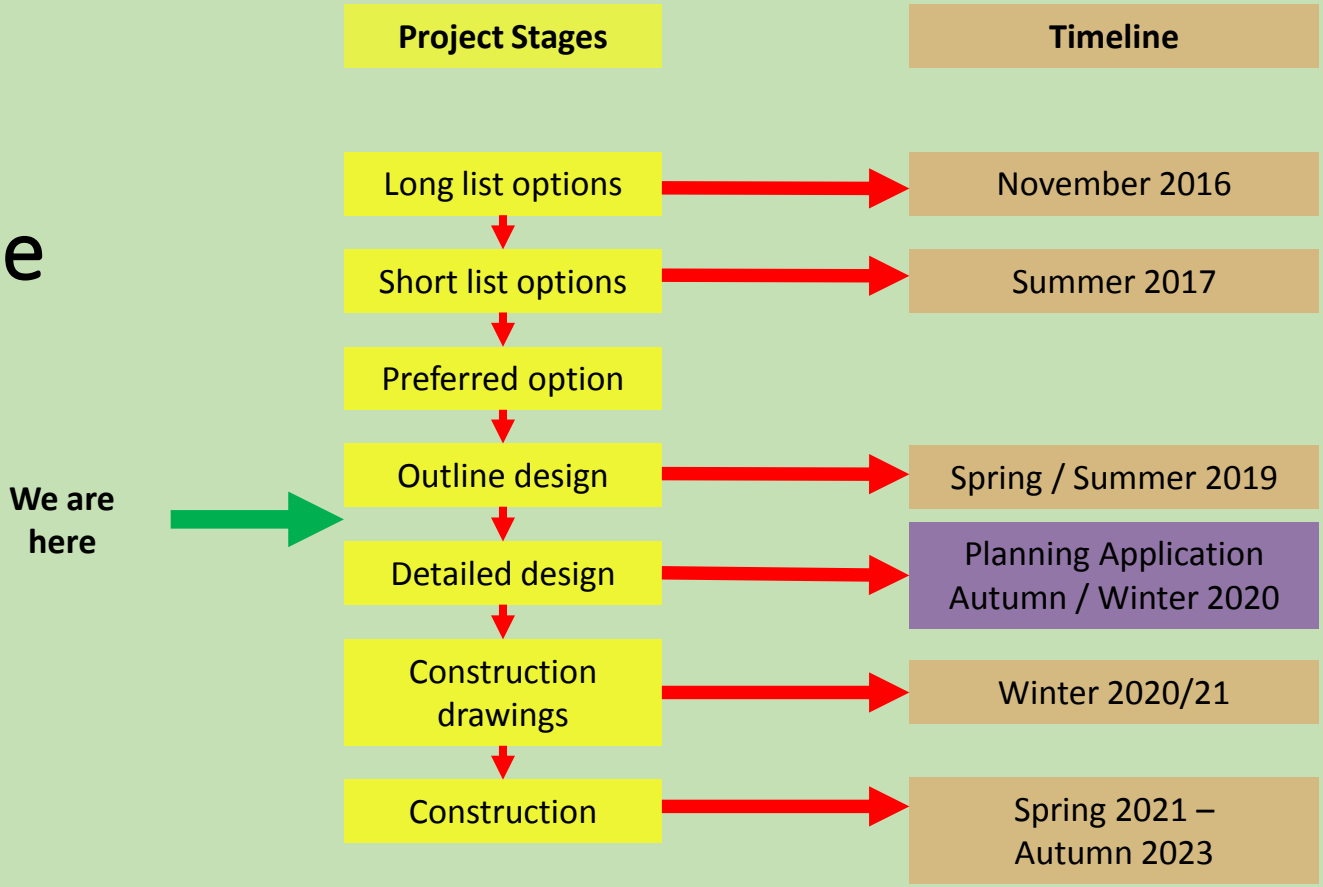
Lot 2: Kier Integrated Services Ltd

South East Hub

Lot 1: Jeremy Benn Associates Ltd

Lot 2: VolkerStevin Ltd

Programme

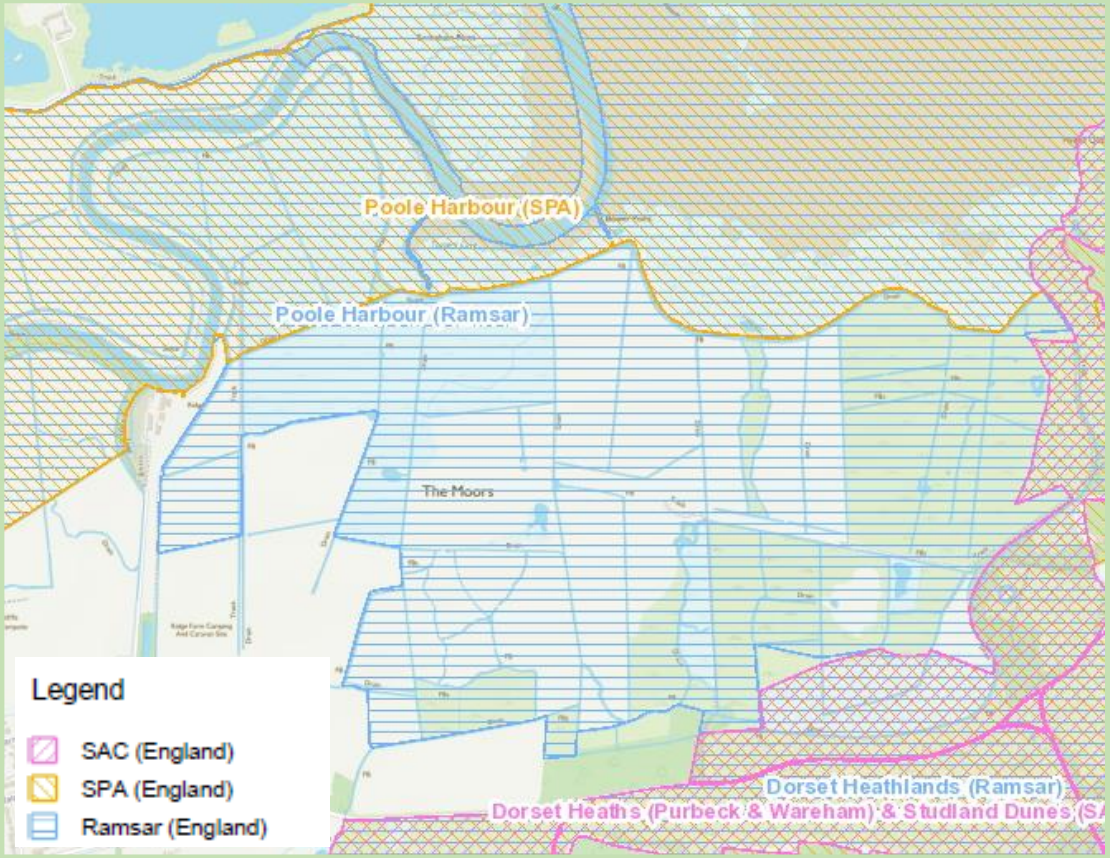

Project Stages
Timeline
Long list options
November 2016
Short list options
Summer 2017
Preferred option
Outline design
Spring / Summer 2019
We are here
Detailed design
Planning Application
Autumn / Winter 2020
Construction drawings
Winter 2020/21
Construction
Spring 2021 –
Autumn 2023

Location of Lagoons – Key Decision Making Factors

Legislative Compliance

Cost

Ecological Functionality

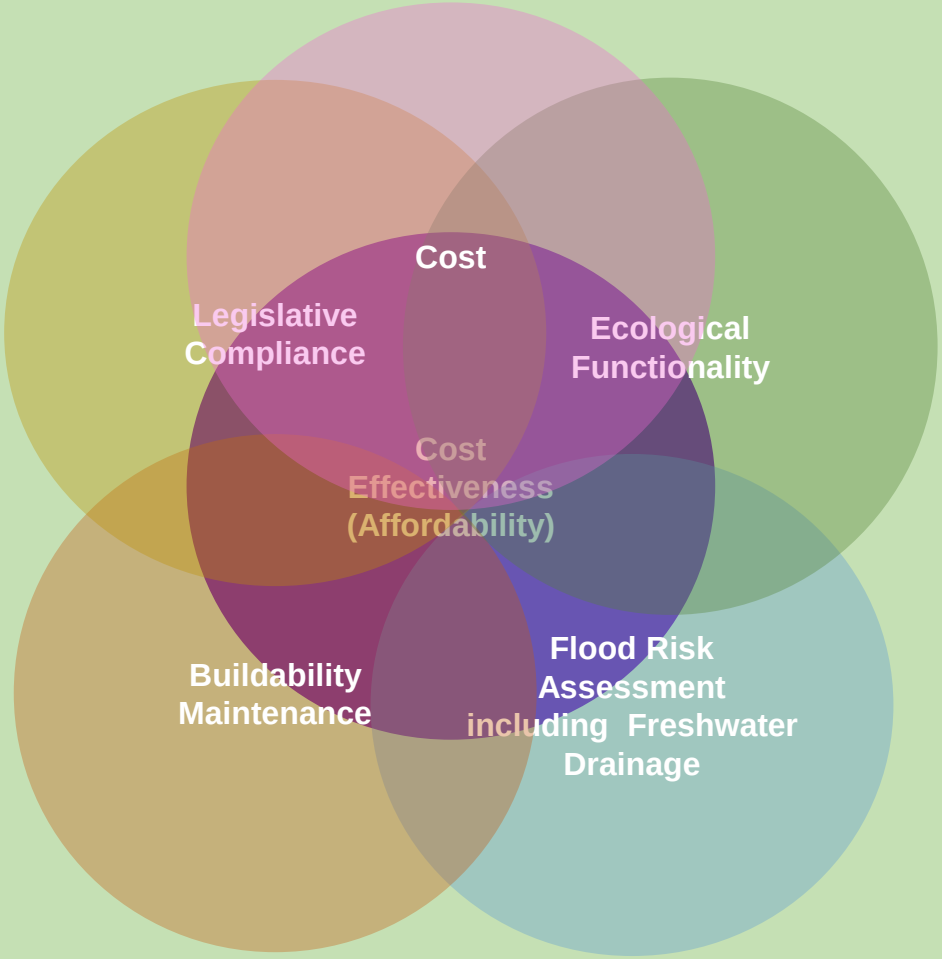


Buildability Maintenance

Cost Effectiveness (Affordability)

Flood Risk Assesment including Freshwater Drainage

Location of Lagoons – Key Decision Making Factors



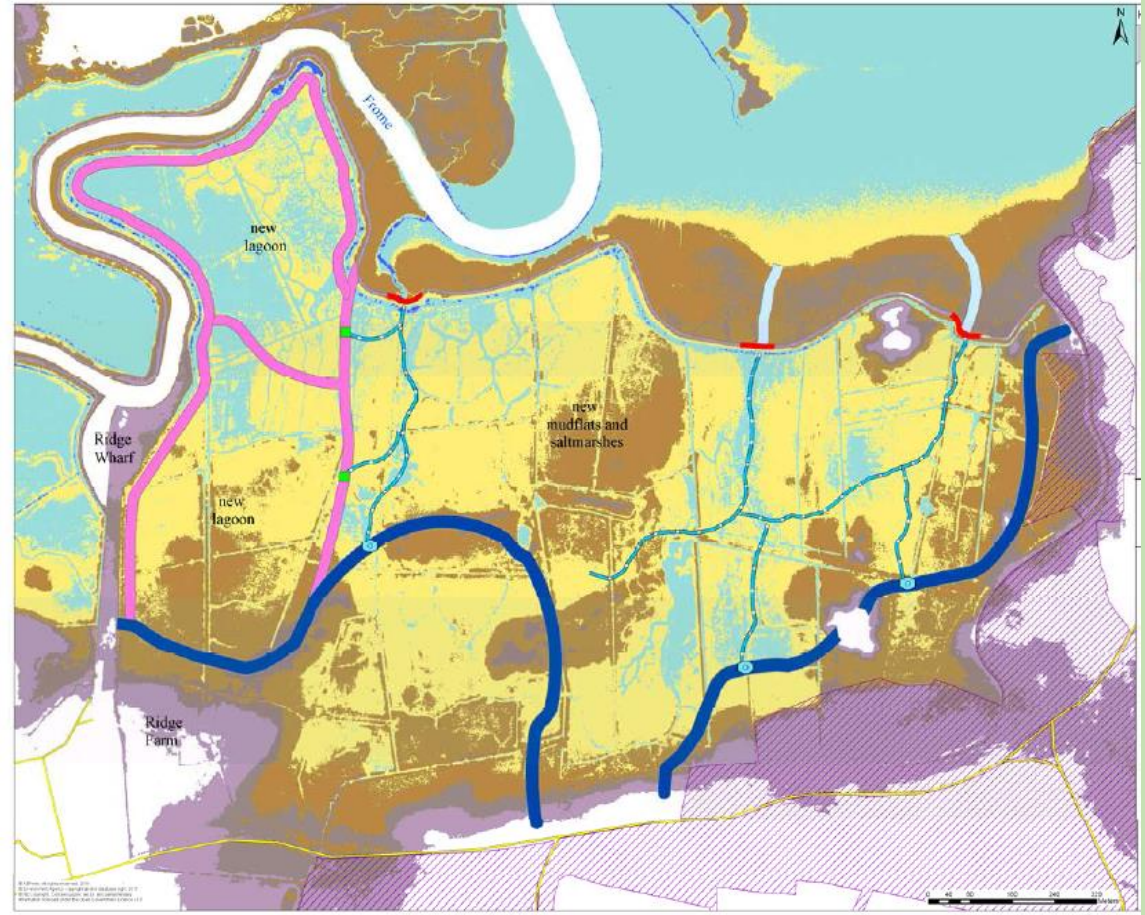
Location of Lagoons – Key Decision Making Factors

Legislative Compliance

Cost

?

Ecological Functionality



Buildability Maintenance

Cost Effectiveness (Affordability

?

Flood Risk Assessment including Drainage

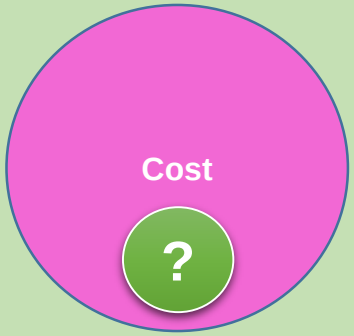
?

Legislative Compliance

- Northern lagoon maintains and enhances the functioning of the existing SPA.
- Open breaches rather than RTE delivers the RAMSAR objective of working with and restoring natural processes.
- The adverse effects on existing protected species will be addressed through mitigation and licencing.

Ecological Functionality

- Lagoons are of a sufficient size to avoid edge effects.
- Two lagoons enable a range of conditions to be provided (water depth & salinity), thus catering for the range of species using the site.
- Two lagoons enables maintenance to be undertaken whilst maintaining the function of the SPA.

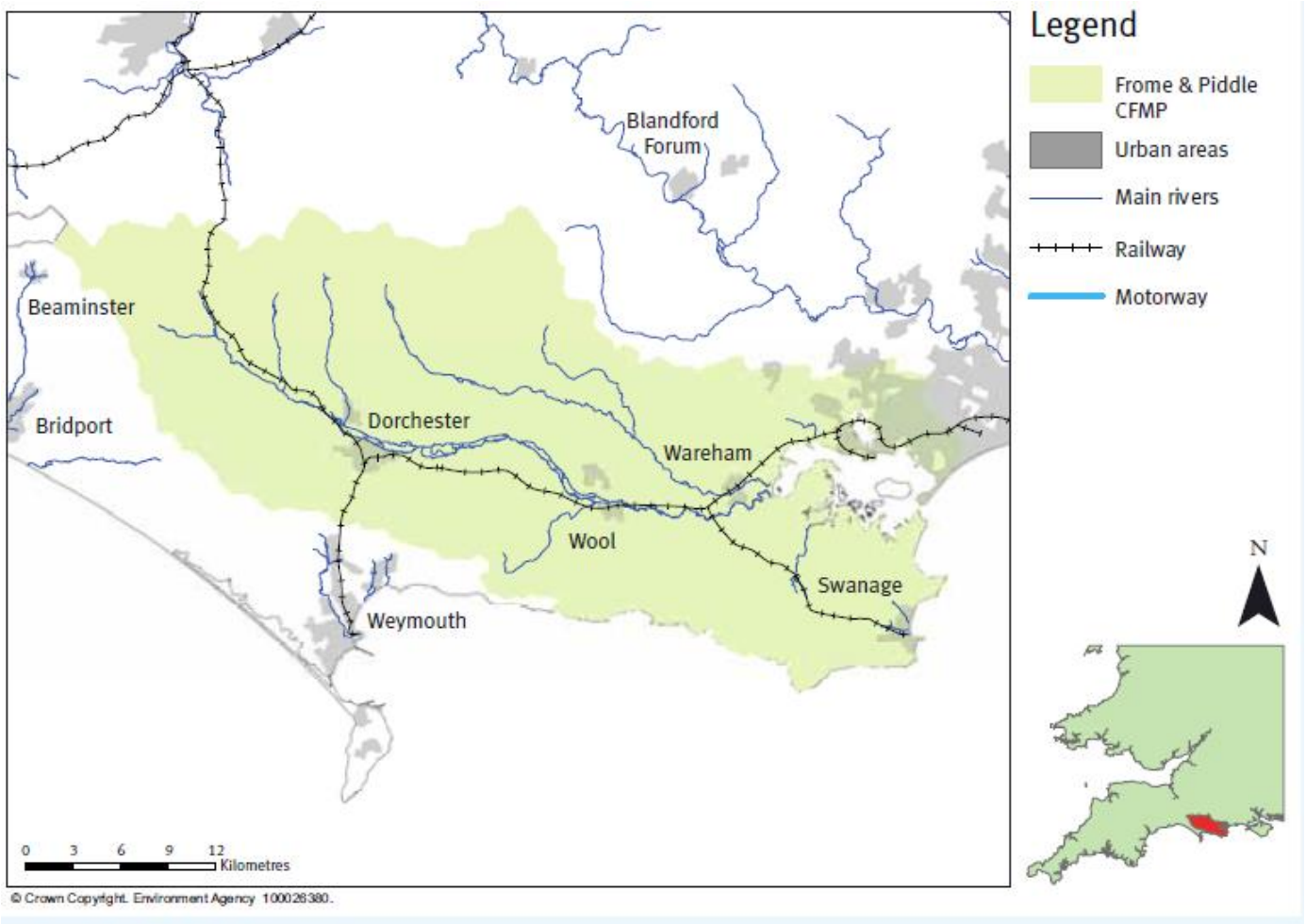


- Makes best use of existing fronting and western embankments.
- Minimum need for new embankments

- Maintains the existing Furzebrook route which provides direct drainage via Turners Cove .
- The exact location of the southern embankment (blue line) will be positioned to satisfy flood risk requirements.

Siltation

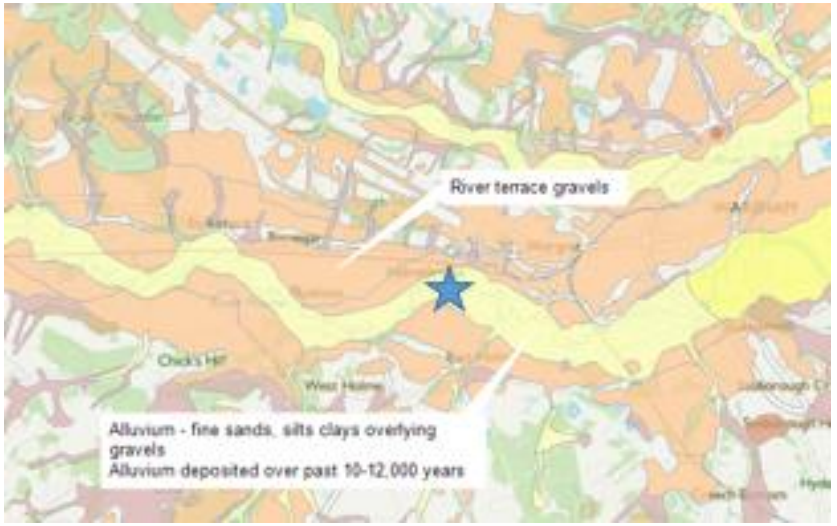
Rivers Frome and Piddle Catchment Areas



Lower Frome Sediment regime

Lower Frome suspended Sediment regime

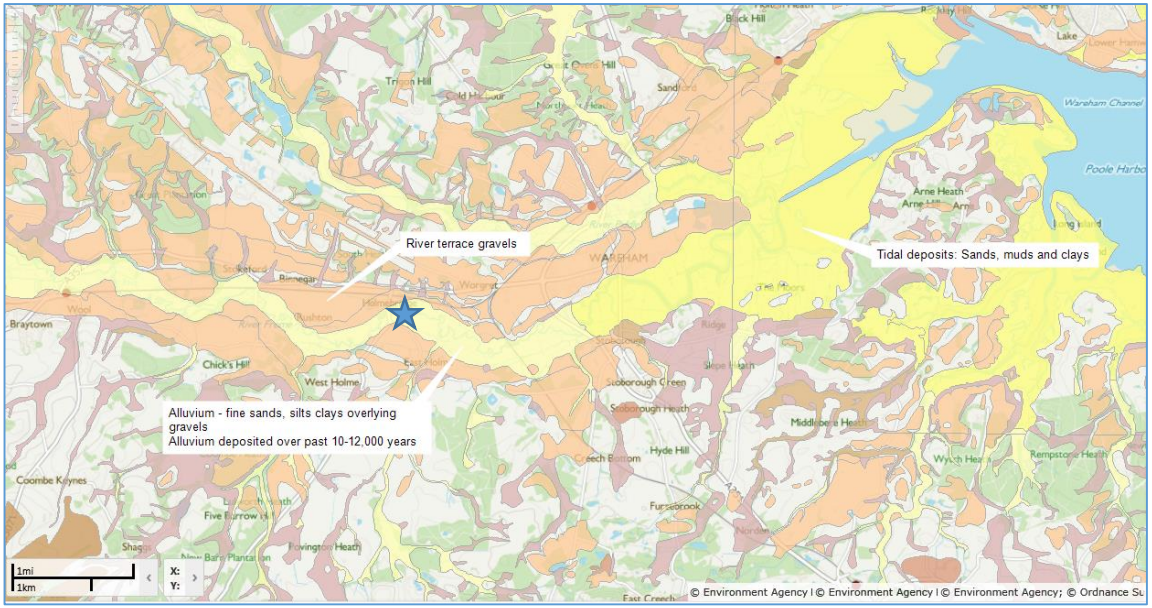
- Mean annual **<u>suspended sediment load</u>** at Holme Bridge has been estimated as 4370 t yr^{-1}.
- Suspended sediment = clays, silts and fine sands.
- Approx. 18% of this load is temporarily stored in the gravel bed of the river and mobilised under high flows.
- This equates to 10 t km^{-1} yr^{-1}. being derived from the Frome catchment as a whole.



References
1: Collins, A. L and Walling, D. E (2007). "Fine-grained bed sediment storage within the main channel systems of the Frome and Piddle catchments, Dorset, U.K." Hydrological Processes (21) 1448-1459.
2: Worrall, F, Burt, T. P. and Nicholas J. K. Howden (2013). "The flux of suspended sediment from the UK 1974 to 2010". Journal of Hydrology, (504) 29-39.

Lower Frome Sands & gravel Sediment regime

- Bed sediment load of Lower Frome is mainly comprised of gravels derived from episodic erosion of upstream sources (mainly through bank erosion).
- Relatively low sediment load reflects the mixed geology and landuse of the catchment which contains elements of a classic chalk river system (e.g. Sydling Water and Cerne) with significant runoff generated sandy contribution from upper tributary inputs from Bovington Heath and the Win.
- Gravels transported by river to the tidal reaches of the Frome are derived from upstream paleo-deposits, most significantly the large volumes underlying the alluvium of the extensive Frome floodplain.
- The movement of gravel shoals within the tidal reaches will reflect the ***'Jerky Conveyor' of sediment transport***, i.e. volumes and movement are driven mainly by infrequent large magnitude flow events such as 2012 where bank and bed erosion 'injects' new pulses of sediment down the conveyor which then take years-decades to transit the whole system.



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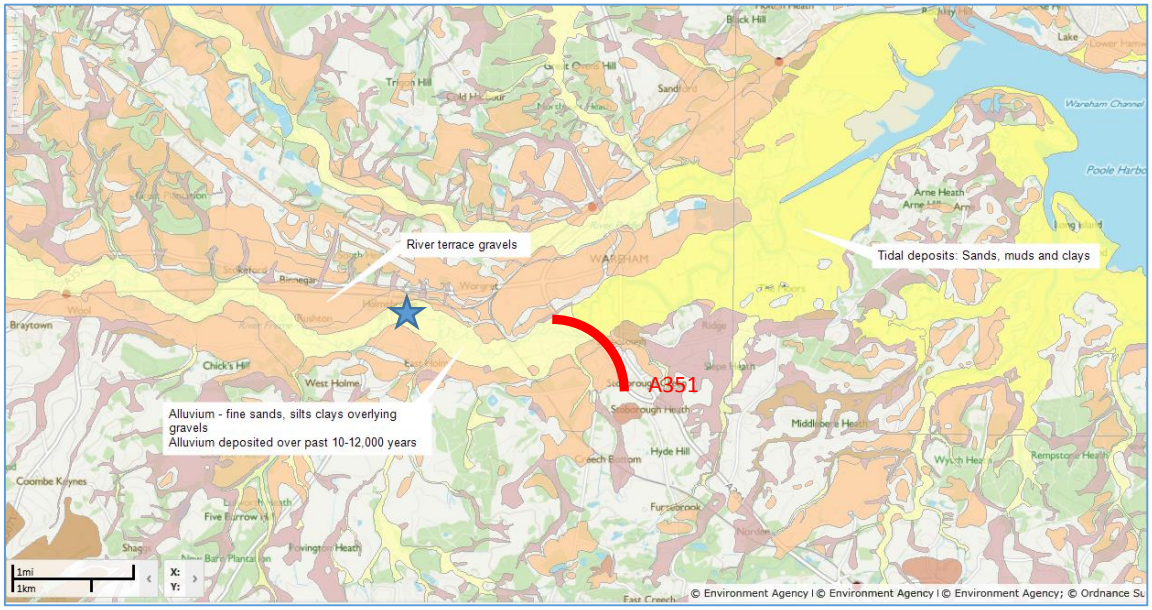
Lower Frome Marine Sediment regime

- Marine sources of sediment in the tidal Frome are a relatively small component of the sediment regime with fluvial sources the dominating within the channel.
- Map shows extent of historic deposition of tidal sands, muds and clays up to A351.
- Poole Harbour is considered to be a ‘closed system’ with regard to marine sediment sources, i.e. the marine sediment load within Poole Harbours is sourced from within its boundaries.
- Erosion of relic tidal deposits from the bed and inter-tidal zone releases material to the system rather than imports from the open coast
- Tidal sediments are mainly fine sand, silts and clays only.



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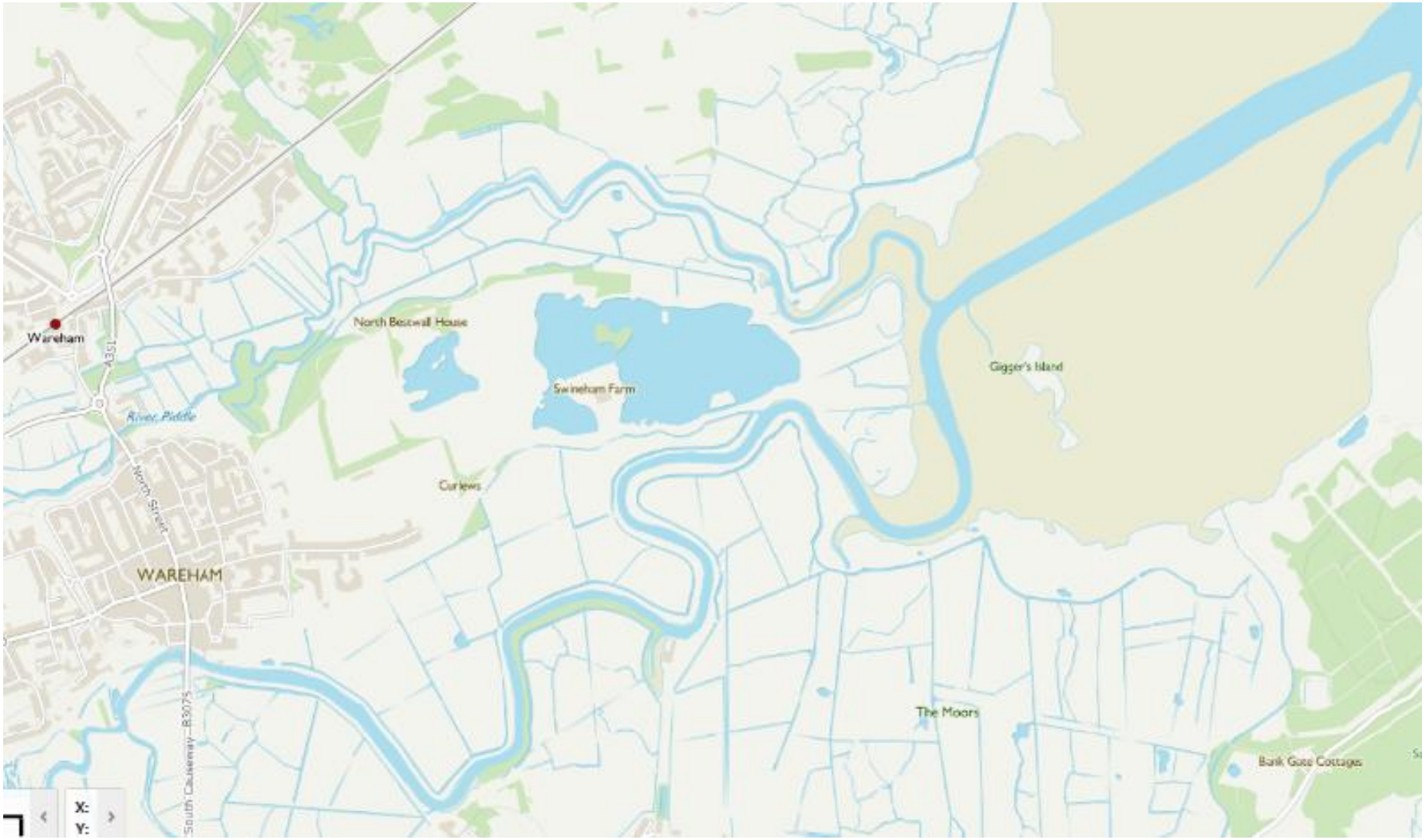
Poole Harbour

Poole Harbour Baseline Document for Maintenance Dredging Protocol (2012)

Location	Sedimentation m^3/year	Material Type
Swash Channel	21,000	Sand
Middle Ship Channel	20,500	Predominantly Sand
Turning Basin	13,000	Predominantly Silt
Elsewhere in the Harbour	34,000	Predominantly Silt

The table displays the yearly sedimentation rate of the main channels and the other areas of the Harbour, having a total rate for the whole Harbour of 88,500m3 per annum.

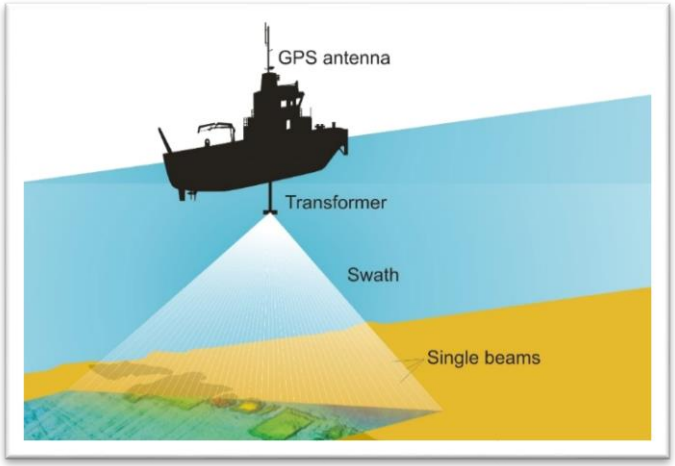
The volume of silt entering the Harbour system from the erosion of the intertidal saltmarsh is estimated to be between 17,500m3 to 26,250m3 of silt per annum, with the total amount of silt entering the Harbour, estimated between 20,000 m3 and 40,000 m3.

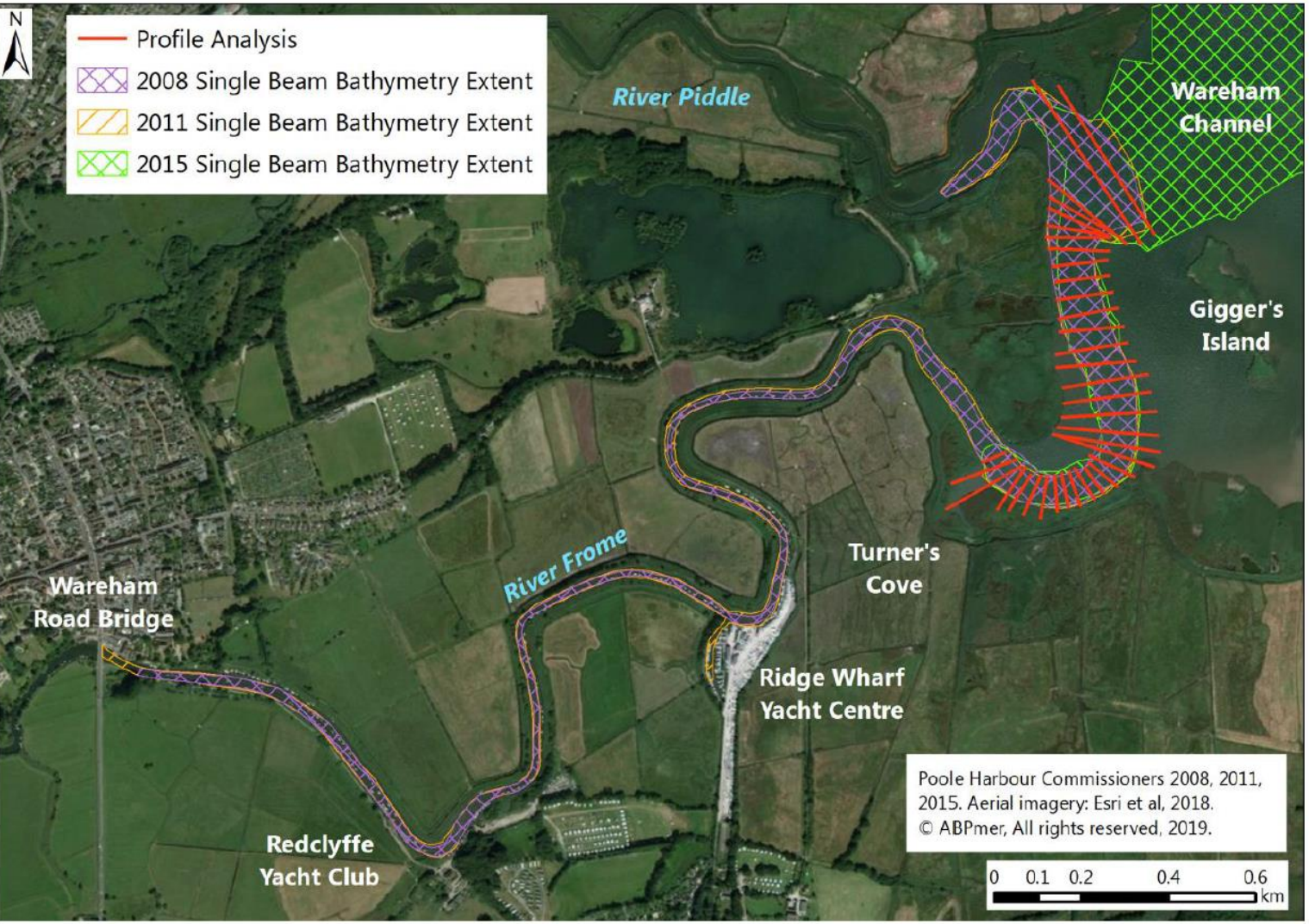

Wareham
A351
North Bestwall House
Swineham Farm
Gigger's Island
River Piddle
North Street
Curlews
WAREHAM
South Causeway - B3075
The Moors
Bank Gate Cottages
X:
Y:


Continuation to
WAREHAM
on the same scale
Wooded
Wooded
Swineham
WAREHAM
Swineham Point
Mud
Mud
Turner's Cave
River Frome
TOWER (conspic)
St Mary's Ch
(ruins)
Castle Dyke
Ridge Wharf
Yacht Centre
Slip
NOTE
Craft are prohibited from anchoring in the positions indicated which are salmon holes.
The Moors
Redcliff Yacht Club
Red Cliff
Redcliff Farm
50° 41'
2° 5'

Bathymetry

This is used to provide a map of the bottom of a water body. The multi-beam or single beam echo sounders, use sonar pulses to measure the distance between the survey vessel and the sea/river bed. The Environment Agency has accessed data collected by Poole Harbour Commissioners back to 2008.




N
Profile Analysis
2008 Single Beam Bathymetry Extent
2011 Single Beam Bathymetry Extent
2015 Single Beam Bathymetry Extent
River Piddle
Wareham Channel
Gigger's Island
River Frome
Turner's Cove
Wareham Road Bridge
Ridge Wharf Yacht Centre
Redclyffe Yacht Club
Poole Harbour Commissioners 2008, 2011, 2015. Aerial imagery: Esri et al, 2018.
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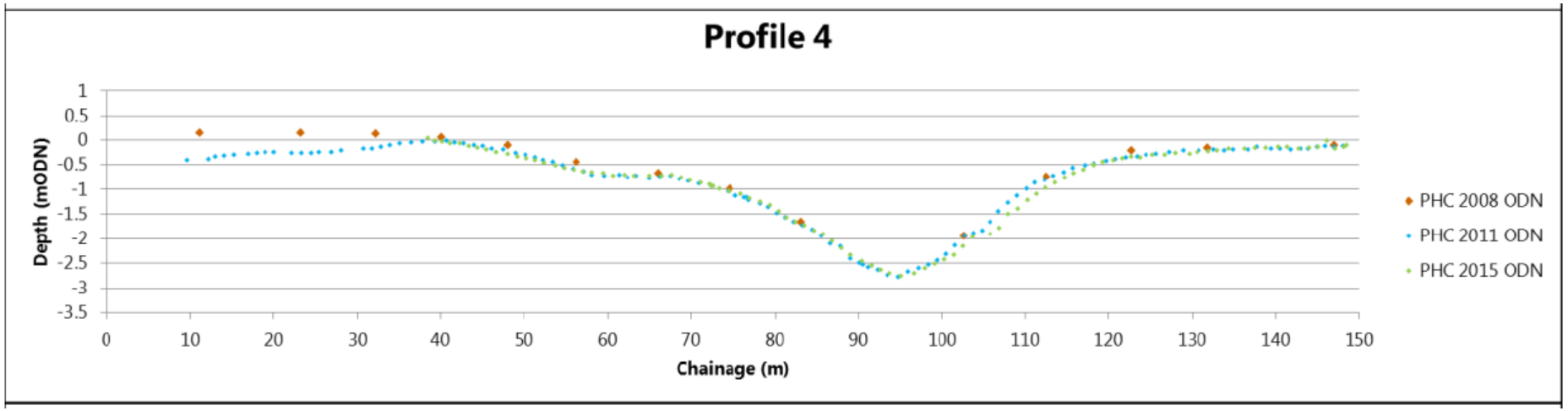
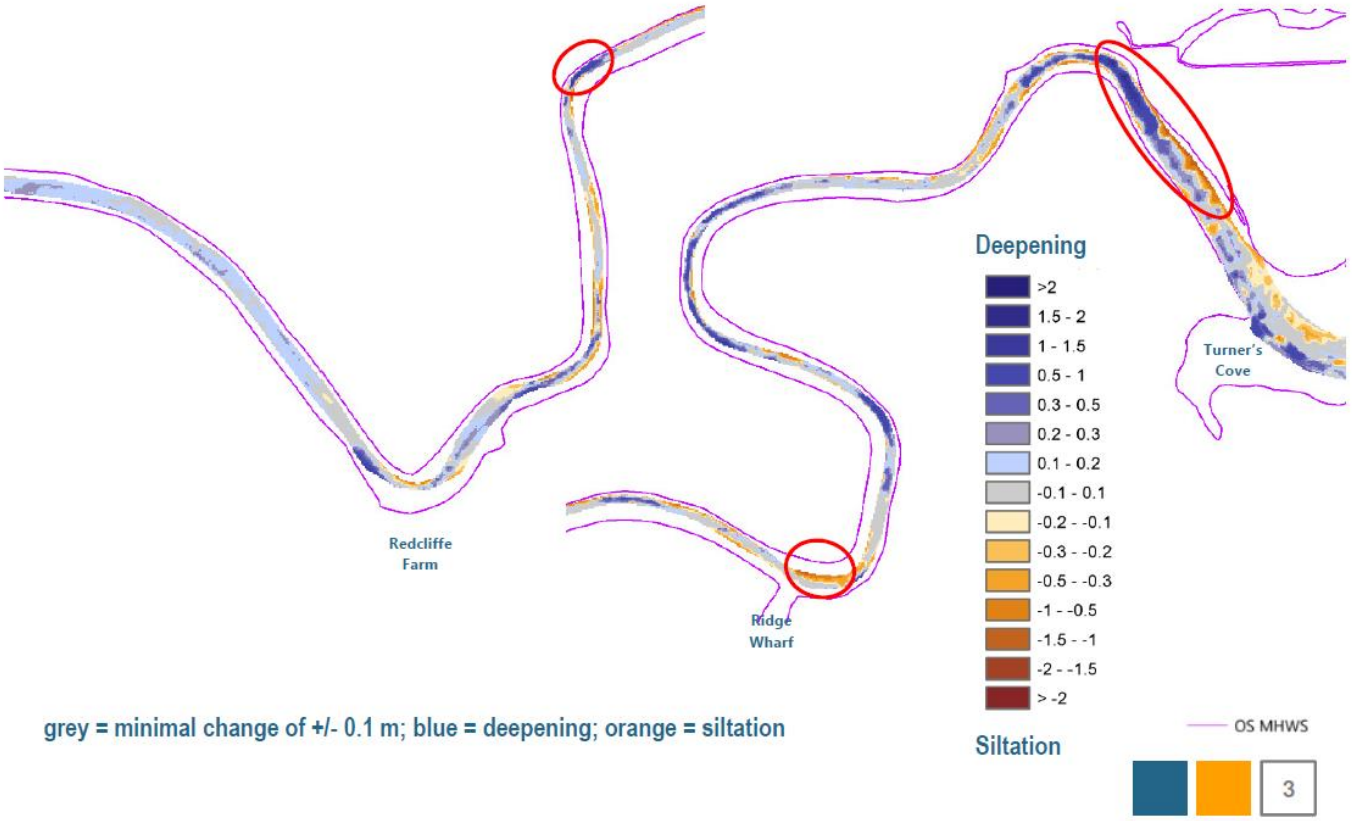
0 0.1 0.2 0.4 0.6
km

Typical channel cross-section

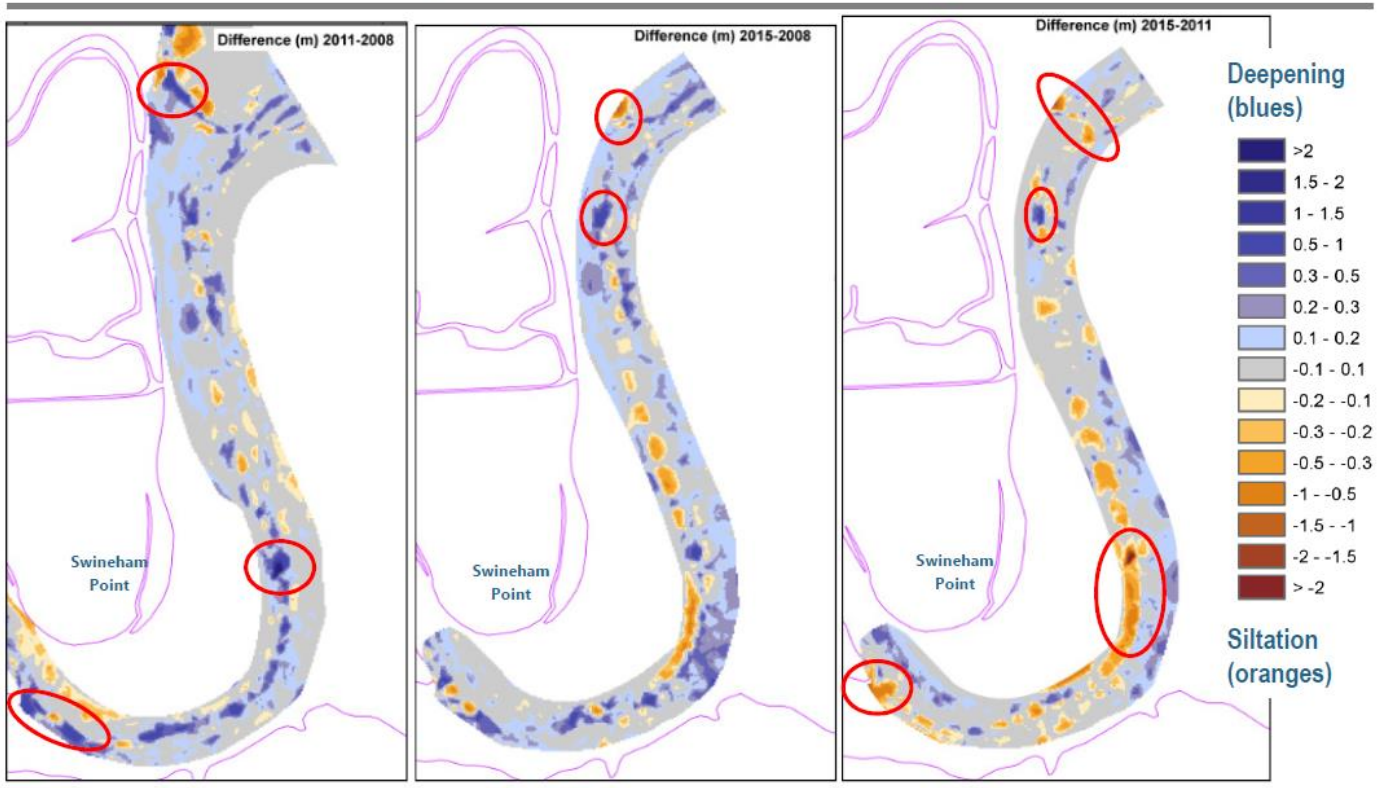


Preliminary Results – Frome (change betw. 2008 & 2011 only)



grey = minimal change of +/- 0.1 m; blue = deepening; orange = siltation

Preliminary Results – Mouth of Frome to Piddle

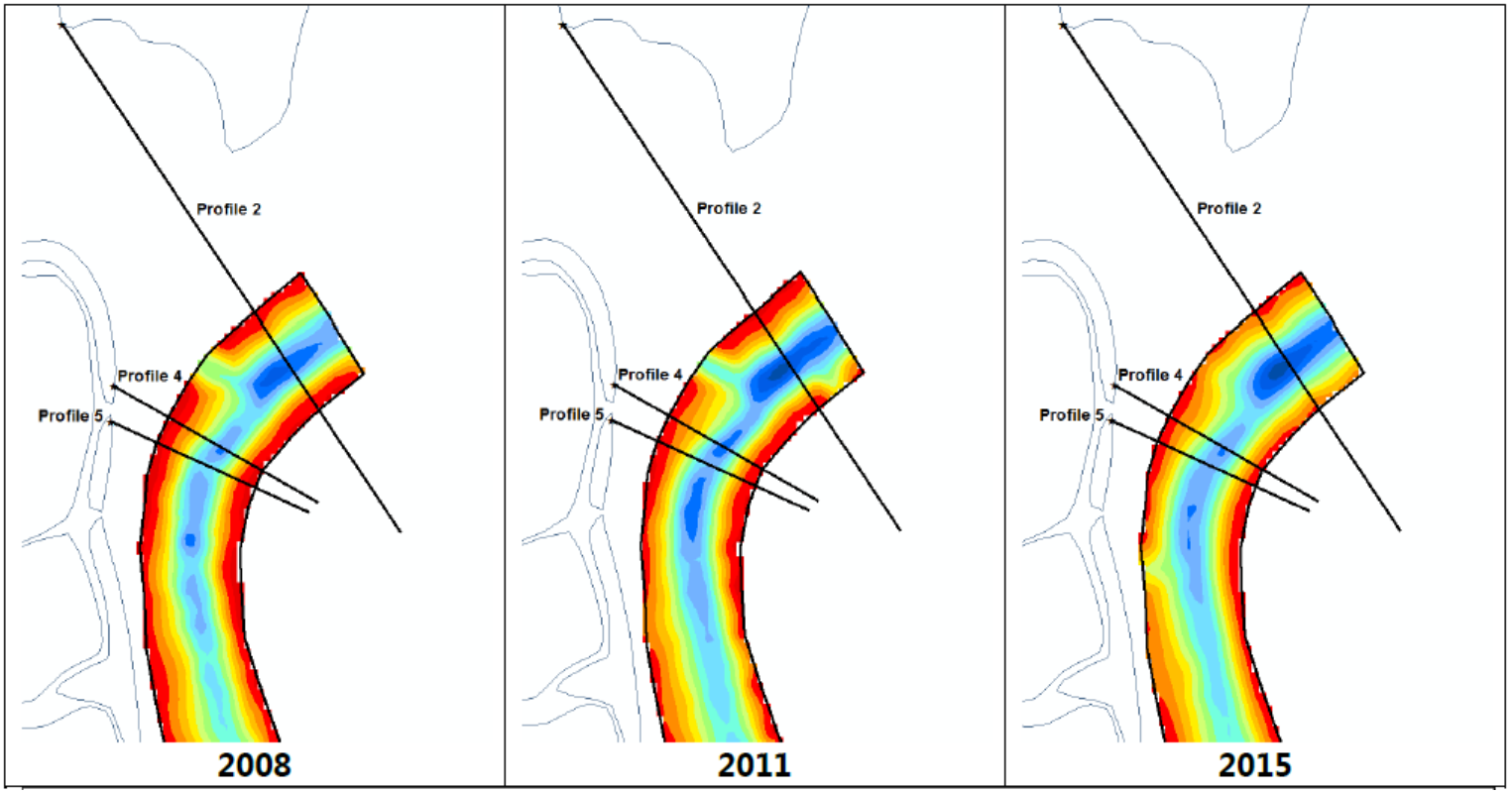


Difference: 2008 - 2011 2008 - 2015 2011 - 2015

OS MHWS

grey = minimal change of +/- 0.1 m; blue = deepening; orange = siltation

Red circles highlight substantial changes > 0.5 -1.5 m


Profile 2
Profile 4
Profile 5
2008
Profile 2
Profile 4
Profile 5
2011
Profile 2
Profile 4
Profile 5
2015

Wareham Channel

At the confluence of the River Piddle with the Wareham Channel, the following high level observations can be made:

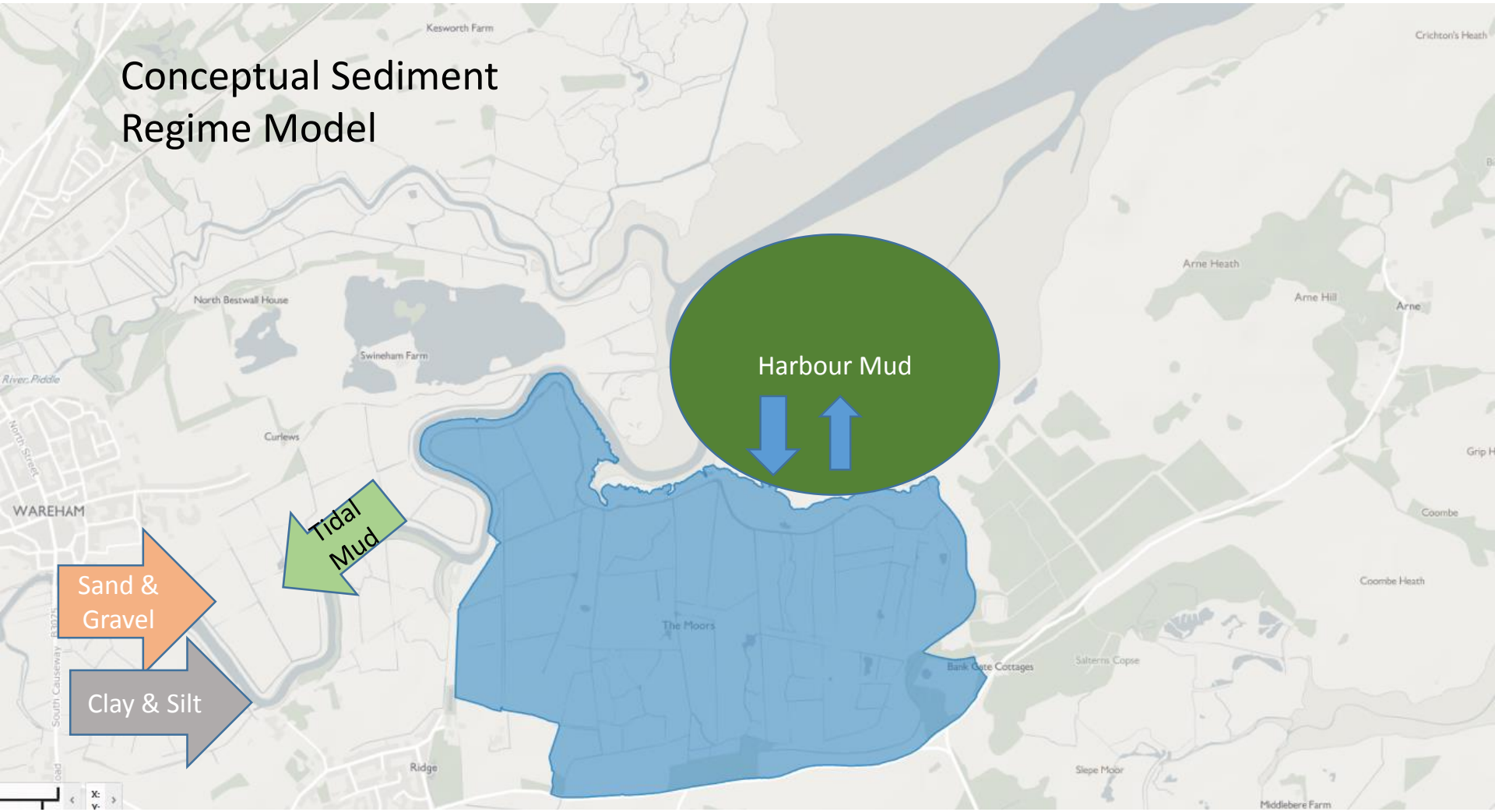
- There appears to have been a slight positional shift of the channel upstream in the Piddle;
- The deepest channel depths at the confluence have remained consistent at *circa* -3 mODN; and
- A gradual and consistent shallowing in gradient of the southern/eastern bank of the Wareham Channel, opposite the confluence with the River Piddle, has occurred between 2008 and 2015.

Wareham Channel

The initial findings of the bathymetric analysis suggest that:

- The position of the channel at the mouth of the River Piddle is dynamic and was subject to change throughout the seven-year period of the datasets;
- Mid-channel depths of the Wareham Channel between Gigger's Island and Turner's Cove remained generally consistent;
- A meander in the Wareham Channel undertook a southeast migration in the area between Gigger's Island and Turner's Cove post 2011;
- Mid-channel depths near Turner's Cove have remained relatively consistent; and
- Depth changes within the River Frome subtidal channel are highly localised and no consistent trend of siltation could be identified over the scale of the study extent with the two available datasets (noting the limited resolution/spatial coverage of the soundings in the River Frome, and limitations associated with the methods of analysis.

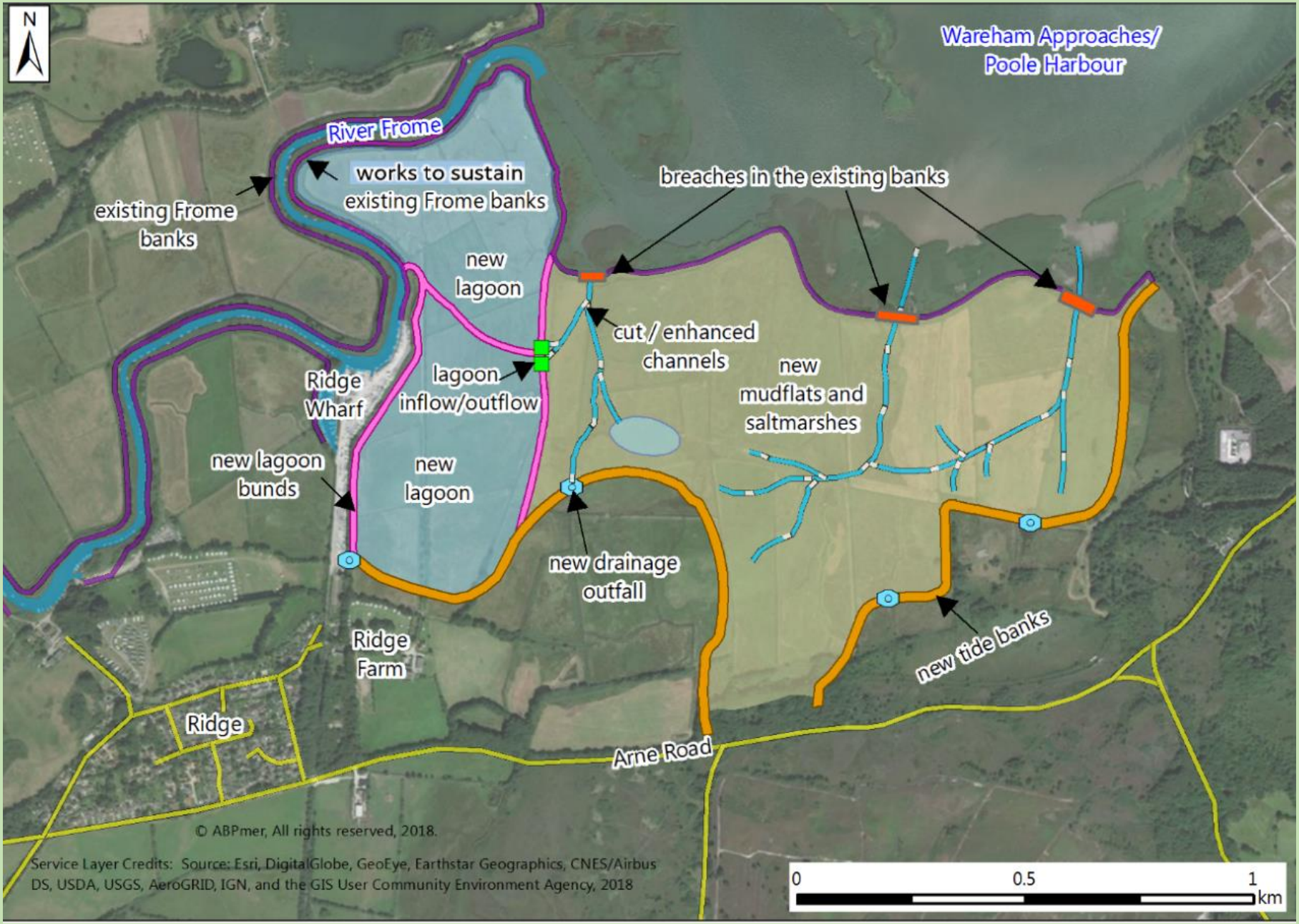
Conceptual Sediment Regime Model



Update on Visitor Access

Current thinking …

Open Forum


N
Wareham Approaches/
Poole Harbour
River Frome
works to sustain
existing Frome banks
existing Frome
banks
breaches in the existing banks
new
lagoon
cut / enhanced
channels
new
mudflats and
saltmarshes
Ridge
Wharf
lagoon
inflow/outflow
new lagoon
bunds
new
lagoon
new drainage
outfall
new tide banks
Ridge
Farm
Ridge
Arne Road
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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus
DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Environment Agency, 2018
0
0.5
1
km

Next Steps

- Freshwater modelling
- Flood Risk assessment
- Ecological assessments
- Environment Agency Assurance (Outline Business Case Approval)
- Appoint Detailed Design Consultant

Stakeholder Liaison Group

- Thank You