SUFFOLK YACHT HARBOUR

Saltmarsh management scheme 2014/5

Discharge point at Loompit Lake

Project Proposal: Each year Suffolk Yacht Harbour at Levington on the River Orwell in Suffolk must undertake a dredging campaign to ensure sufficient depths at all states of the tide for its pontoon berths. Since 1993, it has been licensed to deposit dredging spoil at managed sites on the foreshore approved by Defra and Natural England. The amount discharged annually is between 15,000-20,000 cubic metres.

The proposal for 2014/15 was to transfer the operation to two degraded SPA and SSSI habitats adjacent to the Yacht Harbour: to the West on the fringing saltmarsh at the head of Levington Creek and to the East on a high mudflat behind a historically breached defence beside Loompit Lake.

This project was devised in collaboration with Suffolk Yacht Harbour at Levington, Suffolk as a pilot to raise the profile of the strategy for the beneficial use of dredging spoil as an approach to saltmarsh restoration. This strategy was identified in the South Suffolk and Essex Shoreline Management Plan by the Environment Agency as a cost effective option that delivers wider environmental benefits.

The partners in this scheme are Suffolk Yacht Harbour, Ipswich Borough Council, Suffolk Coast and Heaths AONB Unit, Environment Agency, Natural England and Suffolk Wildlife Trust. The estimated budget for the project was £60,856.20, whilst the working fund was £61,199. This fund was made up of in-kind support from Suffolk Wildlife Trust, £4000, and Ipswich Borough Council, £3,000, amounts already invested by Environment Agency, £12,000, Suffolk Yacht Harbour, £7,000, direct support from Suffolk County Council, £10,000, ABP Ipswich, £2,000, AONB Sustainable Development Fund, £3,000, VEOLIA, £14,199.

This project was preceded by a thorough consultation exercise where all interested parties, stakeholders and local community members were invited to attend events set up by Suffolk Coast and Heaths AONB Unit, Suffolk Wildlife Trust, Suffolk Yacht Harbour, Environment Agency and Natural England under the auspices of the Stour and Orwell Management Group. The main guidance for this project is the consultation document: "**Stour and Orwell Estuaries Management Group working in partnership with Suffolk Yacht Harbour** Levington Saltmarsh Restoration & Benficial Use of Dredgings Project 2013" produced by Trazar Astley Reid and updated in 2014.

The proposal is to extend the pipeline to each of the two sites and to pump from the western end of the marina via existing concrete drains in the wall of the nature reserve beside the saltmarsh at the head of Levington Creek and from the eastern end into the top corner of the Loompit Lake Site. Prior to the operation, each site would be prepared by placing systems of bunds to retain the silt. It is expected that this will be reviewed on an annual basis and any adjustment deemed necessary to ensure the continuing efficacy of the project should be put in place.

An account of the works carried out on site: The aim of this project is to sequester sediment from the annual dredging operation of Suffolk Yacht Harbour and to use it as recharge on two degraded saltmarsh sites immediately to the West and to the East of the Marina. Upon completion, Suffolk Wildlife Trust has undertaken to manage the monitoring programme.

The **West Marsh** is a substantial area of degraded saltmarsh between the entrance to Levington Creek and Suffolk Yacht Harbour. Although seasonally there is a good crop of Samphire *(Salicorna Europaea)*, Cordgrass *(Spartina Anglica)* and Sea Aster *(Aster Tripolium)*, there is insufficient overall elevation for this to progress any further beyond pioneer growth apart from a margin of middle marsh close to the defence wall and in isolated patches in the body of the marsh that have been colonised by Sea Purslane *(Halimione Portulacoides)* and Sea Lavender *(Limonium Vulgare)*.
The proposal is to install a complex of low barriers within the channel system in order to hold back sediment pumped into the site by the yacht harbor during its seasonal dredging operation.

This is a collaborative project between Suffolk Yacht Harbour, Suffolk Wildlife Trust and Suffolk Coast and Heaths AONB Unit, planned and carried out by Kieran O'Mahony and Simon Read. For all parties there is an understanding that the advantages derived from this project are mutual: Suffolk Yacht Harbour needs a location to deposit dredging spoil in a way that prevents it from returning to the tideway, the saltmarsh will benefit from an influx of sediment that should eventually raise its levels beyond pioneer stage and into a succession of healthy saltmarsh vegetation. This in turn will enhance the biodiversity of the foreshore and provide greater resilience against tidal and wave action.

North Marsh, reversed to show channel complex.

The relative levels of the drain channels and the crest of the saltmarsh are very slight, frequently less than 500mm. Since it does not make sense to install structures reaching beyond these dimensions, we decided to work exclusively with Coir Logs staked directly into the channel bed to impede flow and facilitate the deposition of sediment during the dredging operation. Our approach to this was:

- Map the site and discern the gradients and direction of flow within the marsh.
- Strategically place Coir Logs within the system to incrementally interrupt flow, but avoid the build up of bodies of standing water sufficient to increase hydraulic pressure to the extent that it will cause failure either through undermining or diversion.
- In the first instance, 48 Coir Logs were staked into the channels radiating from the proposed discharge point. In an effort to mitigate the effects of higher velocities and levels of flow, these are positioned more tightly together near the point of discharge than at the outer limits of the channel system.
- The installation took 5 days from 18th to 23rd August 2014.

Coir Logs to be located in the channel system

This is deliberately a very low-key intervention, with the expectation that it may need additional structural intervention during the course of the dredging campaign and year on year as levels rise.

Suffolk Wildlife Trust have set up a monitoring programme based on transects, fixed-point photography and horizon markers.

December 19th 2014: After six weeks dredging, the entire channel system within 50metres of the outfall has become smothered by spoil and the coir bunds further downstream are noticeably holding back sediment. After a period of settlement, there will be one further discharge at this site before attention is transferred to the south site beside Loompit Lake.

Channel system, after the installation of coir logs, during and after completion of pumping operation.

Upon completion of this current season's dredging operation, it is anticipated that the spoil will settle and perhaps stabilize with pioneer vegetation (most likely *Salicorna Europaea* and *Spartina Anglica*). If the new sediment has become stable enough, there is potential for a further continuous outlying structure to encourage levels to build and to establish succession.

Locations of Coir Logs on North Site

The **East site** beside Loompit Lake is predominantly mud flat with very a small saltmarsh fringe of mainly Sea Purslane and Cordgrass towards the landward side. There is a substantial plume of sand at the western end that has progressively built up over at least ten years. This is possibly the result of sediment dropping out from dredging spoil discharged on the adjacent foreshore and carried in on the ebb. In the shelter of this formation examples of other vegetation types such as Shrubby Sea Blight *(Suaeda Vera)*, Golden Samphire *(Limbarda Crithmoides)* and Frosted Orache *(Atriplex Laciniata)* have been recorded.

The site was a reclaimed field where historically the defences had failed upriver before the construction of Suffolk Yacht Harbour. From then the process of

returning to an intertidal landscape has followed a predictable cycle where, in the first instance, saltmarsh vegetation colonised the hard clay of drained pasture. As the original clay defence walls progressively disintegrated, tidal ingress became more dynamic, eroding the derelict pasture whilst depositing soft estuarine silts. Towards the north of the site where it meets rising land, this process is slowing down although the saltmarsh vegetation continues to die away. As in many sites where reclaimed land has returned to the intertidal zone, it remains in a transitional state for a surprisingly long period of time. Eventually without intervention it must reach some kind of equilibrium; but through artificially lowering the tidal dynamic within the site and introducing dredging spoil as recharge, this process is likely to be more rapid and sustainable over a much wider area.

Loompit Lake site reversed to highlight mudflats and channel system.

At present the state of the original sea defence wall is vestigial having eroded back to its riverstone core, no higher than high water neaps. The gradient of the site is oriented roughly northeast southwest; as a consequence it currently drains through two breaches, the main one at the southeast corner beside Loompit Lake and the other at the centre. The strategy for managing the discharge of dredging spoil within the site is threefold:

- Block the two main breaches in the original defence wall to ensure that the spoil will not be carried out directly into the tideway and that tidal exchange within the site will be controlled.
- Construct a pen of brushwood backed up with coir logs using coir blanket around the outfall to mitigate the immediate effects of scour at point of impact.

- Construct a series of low bunds within the site to manage increased flow, discourage the tendency to form substantial drain channels and to encourage deposition as evenly as possible across the site. This is a low-key intervention using coir logs similarly to how they were deployed on the north marsh.


Holding pen at discharge point


Coir bund at upper channel


Single coir log in small channel

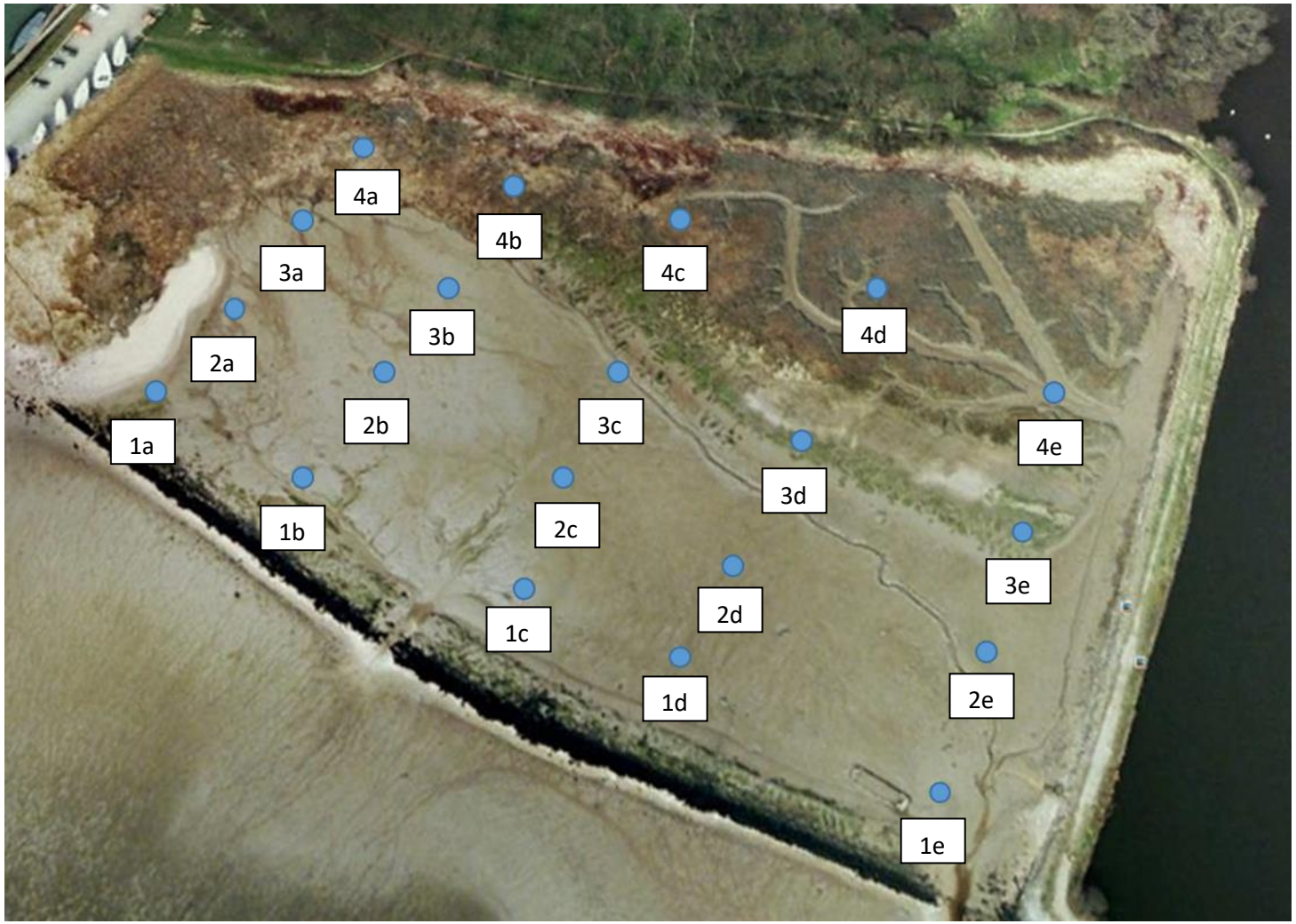
The strategy for the intervention at this site was agreed during Autumn 2014 and installation took place during the weekend of 10th/11th January 2015. Sediment pumping was commenced on site during the week of 19th January. The behaviour of the installation was checked on Monday 26th January and it was seen to be operating efficiently and that flows over the mudflat mitigated well by the complex of coir barriers.

Location of Coir Logs and bunds on the Loompit Site

After the completion of the dredging operation at the Loompit Lake site, it became clear that the bunds that had been put in place had been effective in retaining sediment within the site and ensuring that the existing channel systems were not scoured deeper. Once the sediment has settled, it will become clearer whether or not further work will be needed on the site before the next season.

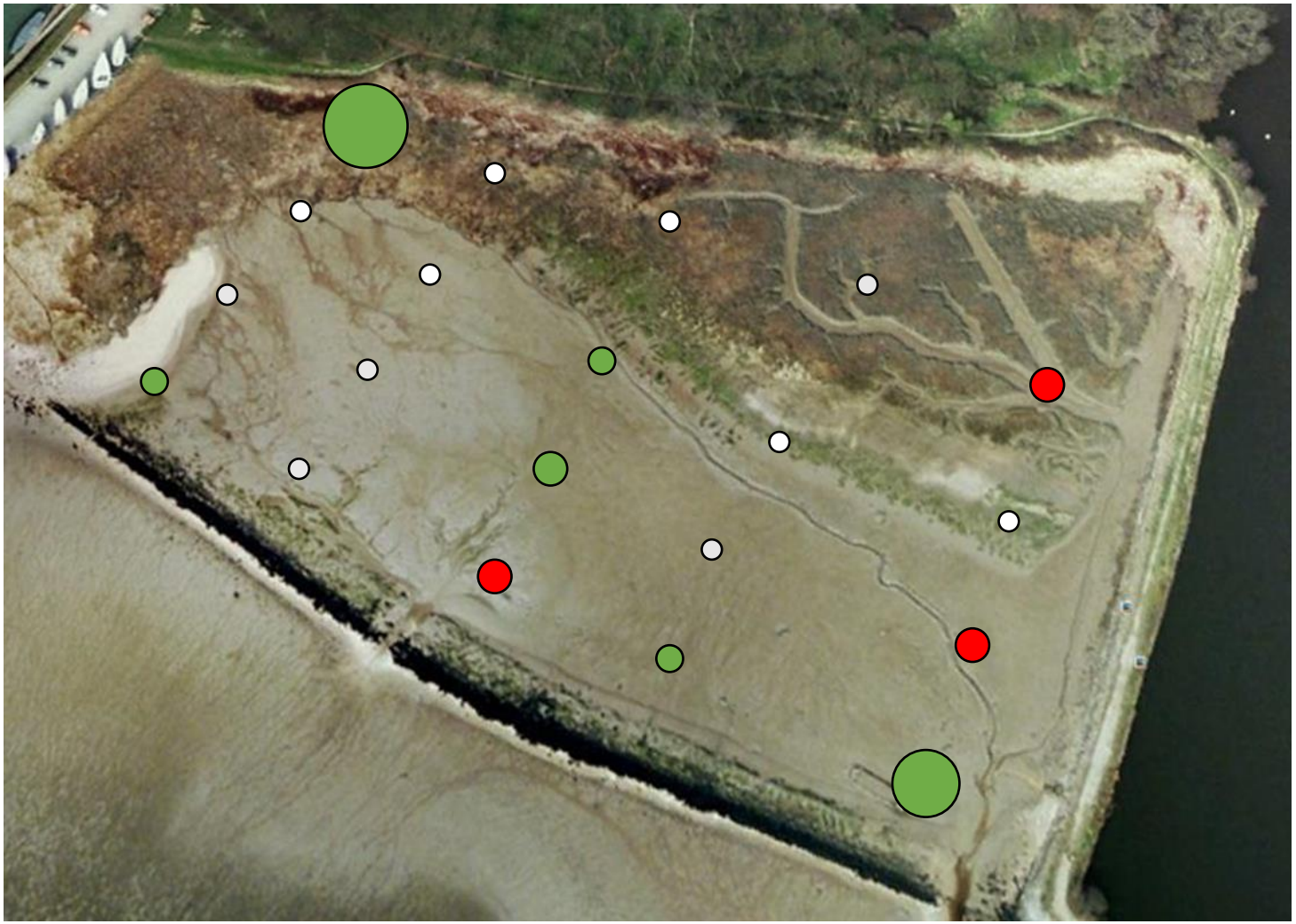
Loompit Lake site after completion of dredging operation, February 2015

There may be a tendency for alternative channel systems to develop on the both East and West sites, however, it is agreed to wait until after the completion of the dredging operation for the current year before deciding upon whether it will be appropriate to install further adaptive measures.



Position of marker

Plate 1. Location of Levington saltmarsh restoration project points – east side January 2015. All stakes set at a height of 500mm.



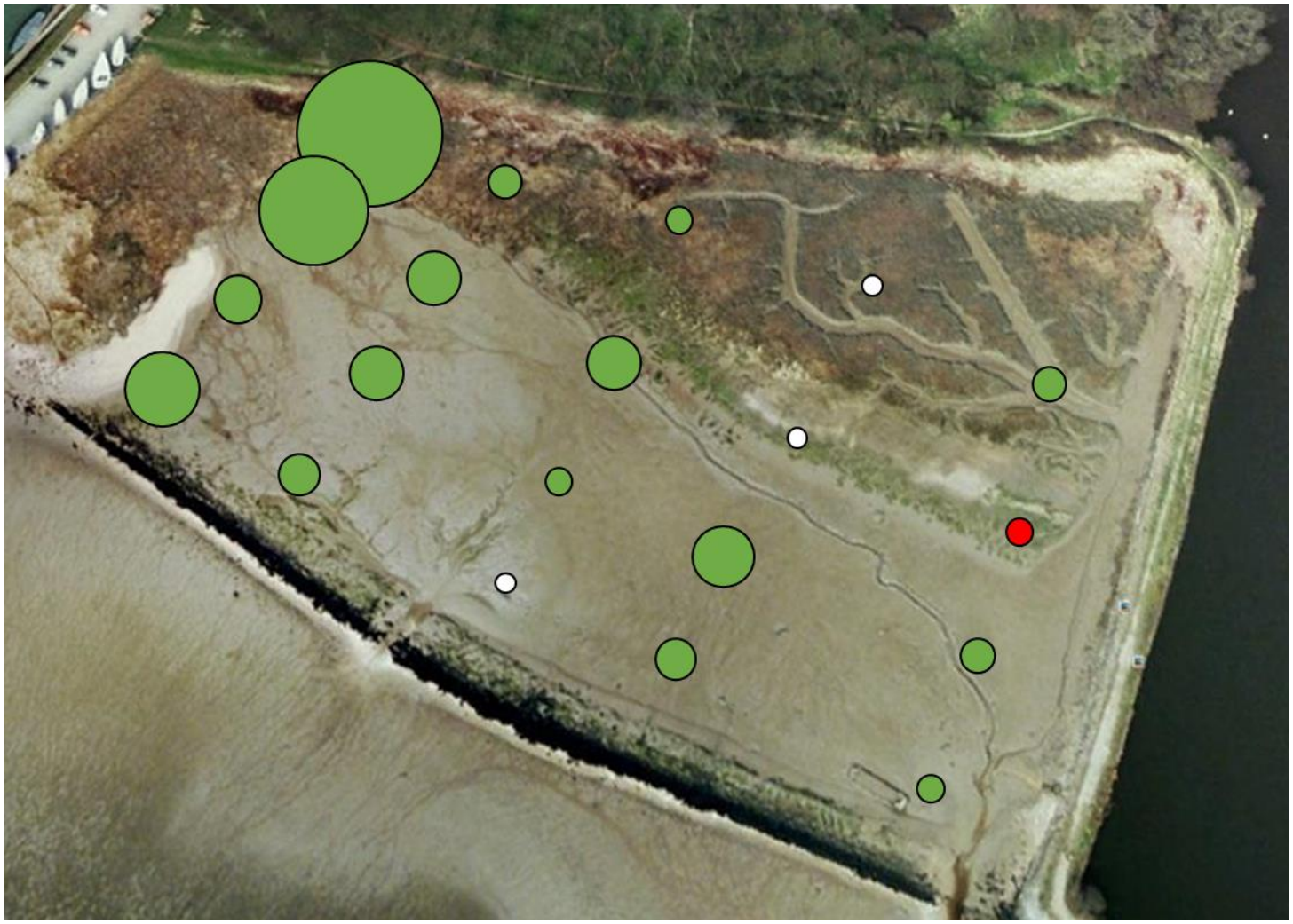
No change

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 2. Status of September 2015 east side Levington saltmarsh project points based on January 2015 measurements.



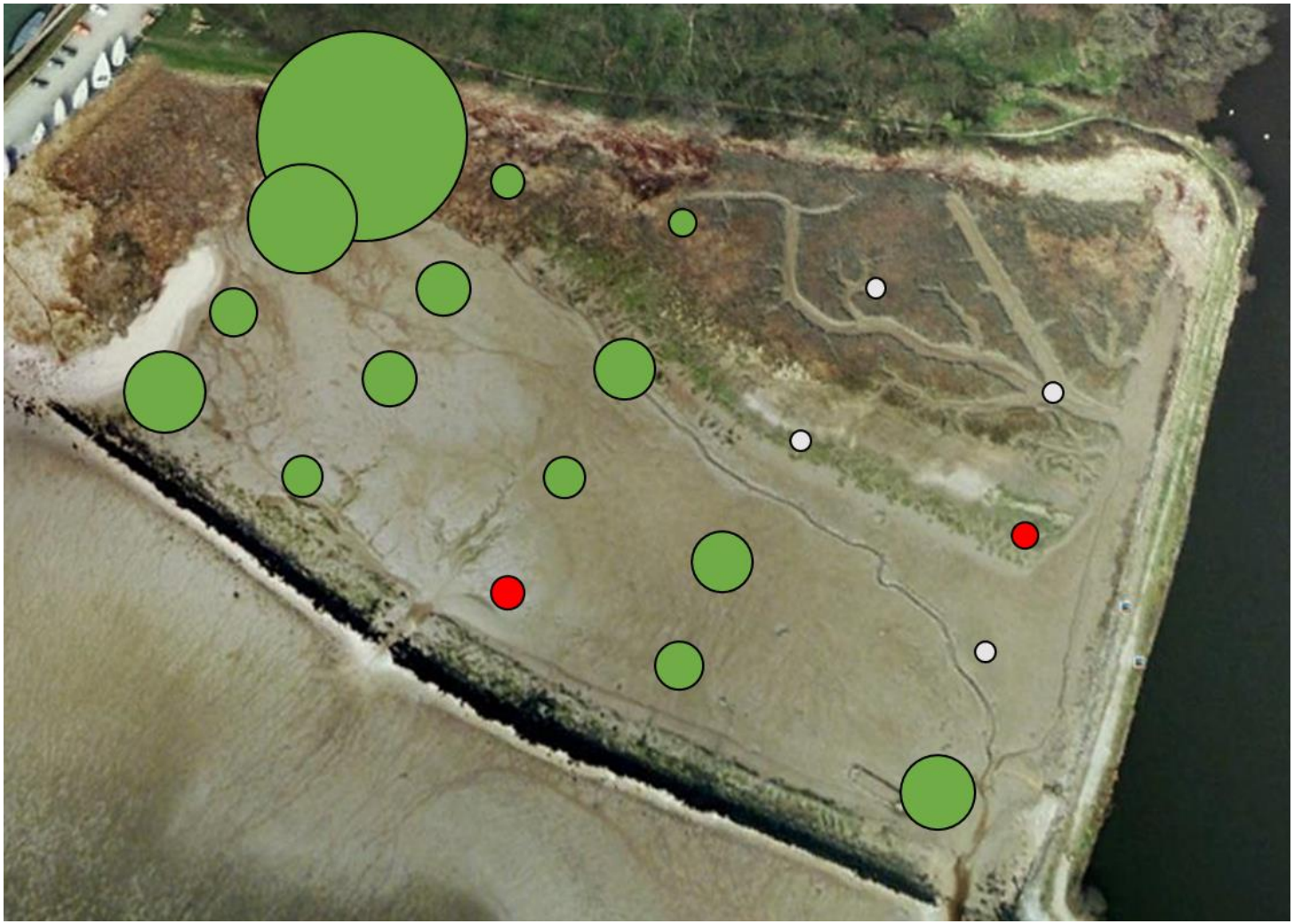
No change

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 3. Status of October 2016 east side Levington saltmarsh project points based on September 2015 measurements.



No change

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 4. Current status of east side Levington saltmarsh project points based on original January 2015 measurements.

Position of marker

Plate 5. Location of Levington saltmarsh restoration project points – west side August 2014. All stakes set at a height of 500mm.

No change

New marker (500mm)

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 6. Status of September 2015 west side Levington saltmarsh project points based on August 2014 measurements.

No change

New marker (500mm)

New marker (500mm) due to erosion

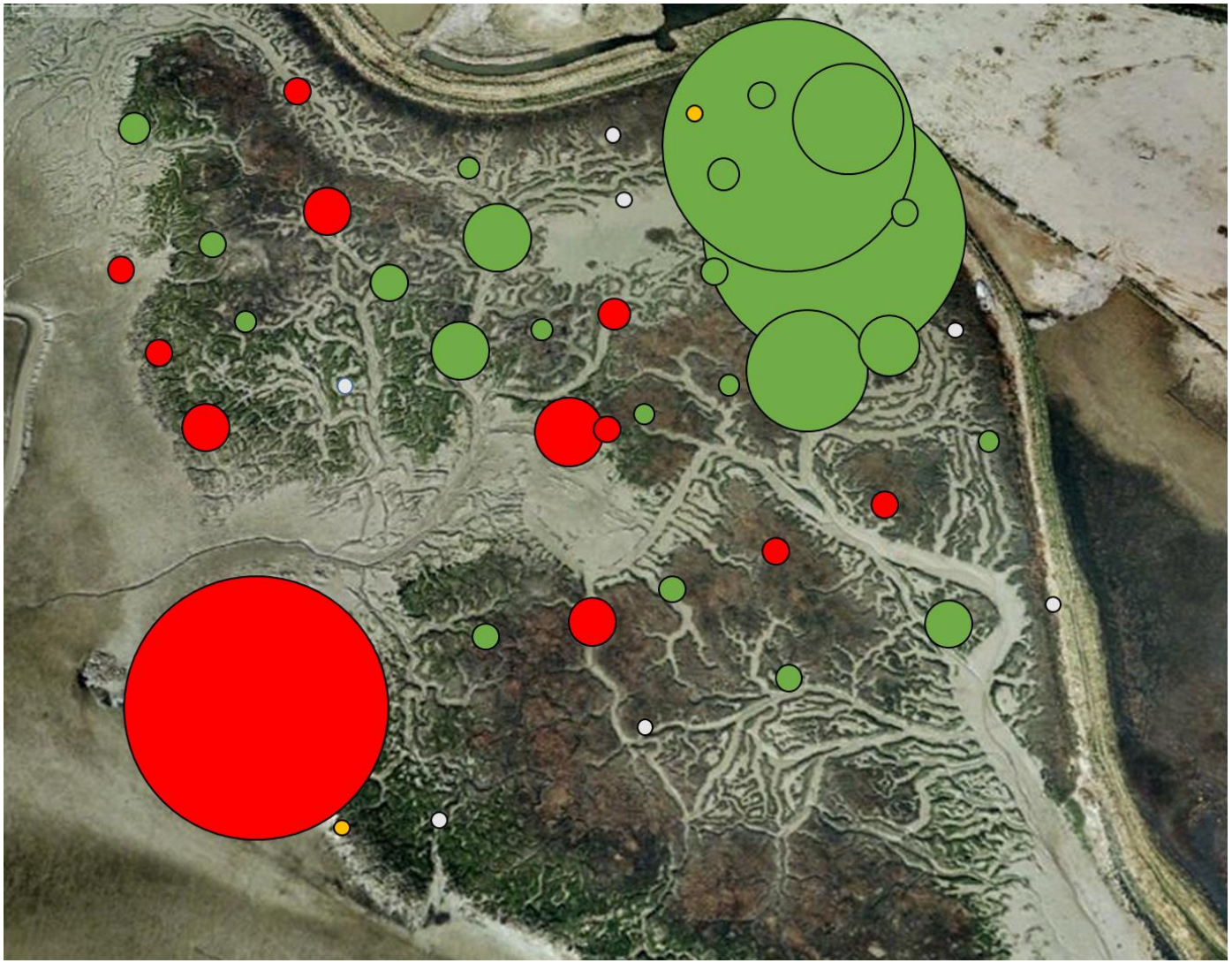
New marker (500mm) due to accretion

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 7. Status of October 2016 west side Levington saltmarsh project points based on September 2015 measurements.



No change

New marker (500mm)

Accretion*

Erosion*

*Object size relative to degree of change.

Plate 8. Current status of west side Levington saltmarsh project points based on original August 2014 measurements.