Soil Excavation pH level Modification

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Abstract

Territories are becoming new areas for conservationist replanting and forestation. Excavators are capable of producing entrainment s for new reservations. There lacks knowledge of soil conditions and methods of measurement of fertility of the developments. This research improves knowledge on the subject of excavations. To decide on territories which can be a best fit for excavations.

Keywords: Territories, Excavation, Soil

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Soil conditions are radical in nature. Particularly across the globe. Unmarked territories are used for new developments [1]. These are green patches of land with some wild life. The pH is a common indicator of fertility [2]. It provides the foundation on which there are new developments [3]. These are territorial and are surrounded by urban developments [4]. This research proposed pH and how it can be used for excavators [5].

Method

Participants

Three green patches of land each at different areas were taken for measurements [6]. Each of these were compared using pH indicator. This was to measure the amount of alkalinity. Where 14 is the highest, 7 is neutral and 0 the least. This was to propose a solution for land excavationist. This was to measure coagulation, fertility, stability for developments of urban areas [7]. To suggest the modification and depth of foundations of excavations.

Assessments and Measures

The pH indicator was inserted 3mm into the green path of soil. These were territories without an urban developments [8]. The coagulation was then obtained as divisible by 3 equivalent to variance of 0 to 4. This fertility indicated using the pH directly as 14 the highest value [9]. The stability was obtained by dividing the pH level by 2 to give a variance of 0 to 6 with the highest as high stability of soil.

Soil Coagulation. The green patches each have there coagulation factor. This is the density of the soil marsh. This in armophous soils such as clay is high. Therefore moisture content can be high in these soils. This is a useful indicator to prevent water flooding of urban developments. Sandy regions, Semi-Sandy or Semi-clay and Clay soils were obtained from the research. The coagulation is different in each situation.

Soil Fertility. This is the amount of organic compared to inorganic elements in the soil. Each green patch can be measured for soil fertility directly with pH indicator. This is optimum for urban developments. For developing land and retaining soil excavations.

Soil Stability. This is a useful factor as it is the opposite of coagulation. It expresses the density in-between soil particles. This has a negative effect on urban conservationist areas. The researcher has to propose this for soil integrity and stability of foundations. To ensure a resistance to crumbling of urban structures. This is the most important factor in the development process. Excavations are unable to commence unless adequate information is provided by the consultants.

Soil Integrity. This is obtained from a unitary value of 3×coagulation+fertility+2×stability. This is an overall hypothesis of the soils performance. This can be used the characterise the soil marsh for urban developments.

Soil Conservation. The urban developments can have different heights and widths. This soil marsh can suggest the structure that can be developed. It is suggested the soil integrity used for high structures are not used for lower developments. Flat detachments and bungalows have different stabilities. This includes the soilintegrity of the urban development. This is optimised using the pH indicator. To obtain a hypothesis on what structures can be developed on soil territories.

Results

The sandy, Semi-Sandy or Semi-clay each had a pH level of 3, 8, 12 for this study. This gives coagulations of 1, 2, 4, fertility the same and stability of 2, 4, 6. This had an overall soil integrity of 12, 22, 32 in each territory developed using the pH indicator.

Soil Coagulation and Fertility

The soil Coagulation was high in clay soil and fertility was equally the same. However to note the Semi-Sandy and Semi-clay had a mixture of optimum properties for urban developments. This can be used for bungalows and flat detachments but not storey structures.

Soil Stability and Integrity

The clay soils were much stable that the soils. This had the most integrity for bungalow but not for flat detachments. As this can cause floodings

Discussion

Soil landscapes were optimised in this research. Semi-clay and clay provided an overall greater soil conservation. Forestry can be preserved using these soils. To improve the overall coagulation, stability and fertility for urban developments. This preserves the habitat for wild life as well. To ensure optimum conditions for forest growths.

Conclusion

Urban developments were a balance of soil integrity and conservation. This can be multi-purpose in nature. It can be concluded that pH level is an adequate indicator of integrity for land developments and structures.

References

1. DataCentre.481482References4831.Friedlingstein P, O'Sullivan M, Jones MW, Andrew RM, Hauck J, OlsenA, et al. Global Carbon 484Budget 2020. Earth Syst Sci Data. 2020;12(4):3269-340. doi: 10.5194/essd-12-3269-2020.4852.Guo LB, Gifford RM. Soil carbon stocks and land use change: a meta analysis. Global Change 486Biology. 2002;8(4):345-60. doi: https://doi.org/10.1046/j.1354-1013.2002.00486.x.4873.Sullivan MJP, Lewis SL, Affum-Baffoe K, Castilho C, Costa F, Sanchez AC, et al. Long-term 488thermal sensitivity of Earth's tropical forests. Science. 2020;368(6493):869-74.4894.McLeod E, Chmura GL, Bouillon S, Salm R, Björk M, Duarte CM, et al. A blueprint for blue 490carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering 491CO2. Frontiers in Ecology and the Environment. 2011;9(10):552-60. doi: 492https://doi.org/10.1890/110004.4935.McOwen CJ, Weatherdon LV, Van Bochove J-W, Sullivan E, Blyth S, Zockler C, et al. A global 494map of saltmarshes. Biodiversity data journal. 2017;(5).4956.Ouyang X, Lee SY. Updated estimates of carbon accumulation rates in coastal marsh 496sediments. Biogeosciences. 2014;11(18):5057-71.4977.Barbier EB, Hacker SD, Kennedy C, Koch EW, Stier AC, Silliman BR. The value of estuarine and 498coastal ecosystem services. Ecological Monographs. 2011;81(2):169-93. doi: 10.1890/10-1510.1. 499PubMed PMID: WOS:000290707600001.5008.Murray NJ, Clemens RS, Phinn SR, Possingham HP, Fuller RA. Tracking the rapid loss of tidal 501wetlands in the Yellow Sea. Frontiers in Ecology and the Environment. 2014;12(5):267-72. doi: 50210.1890/130260.5039.Duarte CM, Dennison WC, Orth RJW, Carruthers TJB. The charisma of coastal ecosystems: 504addressing the imbalance. Estuaries and coasts. 2008;31(2):233-8.50510.Bull JW,

Milner-Gulland EJ. Choosing prevention or cure when mitigating biodiversity loss: 506Trade-offs under ‘no net loss’ policies. Journal of Applied Ecology. 2020;57(2):354-66.50711.Li S, Xie T, Pennings SC, Wang Y, Craft C, Hu M. A comparison of coastal habitat restoration 508projects in China and the United States. Scientific Reports. 2019;9(1):14388. doi: 10.1038/s41598-509019-50930-6.51012.Stewart-Sinclair PJ, Purandare J, Bayraktarov E, Waltham N, Reeves S, Statton J, et al. Blue 511Restoration – Building Confidence and Overcoming Barriers. Frontiers in Marine Science. 2020;7:748.51213.Salzman J, Bennett G, Carroll N, Goldstein A, Jenkins M. The global status and trends of 513Payments for Ecosystem Services. Nature Sustainability. 2018;1(3):136-44.51414.Vieira da Silva L, Everard M, Shore RG. Ecosystem services assessment at Steart Peninsula, 515Somerset, UK. Ecosystem Services. 2014;10:19-34. doi: 516https://doi.org/10.1016/j.ecoser.2014.07.008.51715.Serrano O, Lovelock CE, B. Atwood T, Macreadie PI, Canto R, Phinn S, et al. Australian 518vegetated coastal ecosystems as global hotspots for climate change mitigation. Nature 519Communications. 2019;10(1):4313. doi: 10.1038/s41467-019-12176-8.520.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

2. 16.Needelman BA, Emmer IM, Emmett-Mattox S, Crooks S, Megonigal JP, Myers D, et al. The 521Science and Policy of the Verified Carbon Standard Methodology for Tidal Wetland and Seagrass 522Restoration. Estuaries and Coasts. 2018;41(8):2159-71. doi: 10.1007/s12237-018-0429-0.52317.Wedding LM, Moritsch M, Verutes G, Arkema K,

Hartge E, Reiblich J, et al. Incorporating blue 524carbon sequestration benefits into sub-national climate policies. Global Environmental Change. 5252021:102206. doi: https://doi.org/10.1016/j.gloenvcha.2020.102206.52618.Macreadie PI, Anton A, Raven JA, Beaumont N, Connolly RM, Friess DA, et al. The future of 527Blue Carbon science. Nature Communications. 2019;10(1):3998. doi: 10.1038/s41467-019-11693-w.52819.Lawrence PJ, Smith GR, Sullivan MJ, Mossman HL. Restored saltmarshes lack the topographic 529diversity found in natural habitat. Ecological engineering. 2018;115:58-66.53020.Mossman HL, Davy AJ, Grant A. Does managed coastal realignment create saltmarshes with 531'equivalent biological characteristics' to natural reference sites? Journal of Applied Ecology. 5322012;49(6):1446-56. doi: 10.1111/j.1365-2664.2012.02198.x.53321.Moreno-Mateos D, Power ME, Comín FA, Yockteng R. Structural and Functional Loss in 534Restored Wetland Ecosystems. PLOS Biology. 2012;10(1):e1001247. doi:53510.1371/journal.pbio.1001247.53622.Moritsch MM, Young M, Carnell P, Macreadie PI, Lovelock C, Nicholson E, et al. Estimating 537blue carbon sequestration under coastal management scenarios. Science of The Total Environment. 5382021;777:145962. doi: https://doi.org/10.1016/j.scitotenv.2021.145962.53923.MacDonald MA, de Ruyck C, Field RH, Bedford A, Bradbury RB. Benefits of coastal managed 540realignment for society: Evidence from ecosystem service assessments in two UK regions. Estuarine, 541Coastal andShelf Science. 2020;244:105609. doi: https://doi.org/10.1016/j.ecss.2017.09.007.54224.Burden A, Garbutt A, Evans CD. Effect of restoration on saltmarsh carbon accumulation in 543Eastern England. Biology Letters. 2019;15(1):20180773.54425.Wollenberg JT, Ollerhead J, Chmura GL. Rapid carbon accumulation following managed 545realignment on the Bay of Fundy. PLOS ONE. 2018;13(3):e0193930. doi: 54610.1371/journal.pone.0193930.54726.Hoogsteen MJJ, Lantinga EA, Bakker EJ, Groot JCJ, Tittonell PA. Estimating soil organic carbon 548through loss on ignition: effects of ignition conditions and structural water loss. European Journal of 549Soil Science. 2015;66(2):320-8. doi: https://doi.org/10.1111/ejss.12224.55027.The Greenhouse Gas Protocol. The GHG Protocol for Project Accounting. World Business 551Council for Sustainable Development andWorld Resources Institute; 2005.55228.Mossman HL, Sullivan MJP, Dunk RM, Rae S, Sparkes RT, Pontee, N. Created coastal wetlands 553as carbon stores: potential challenges and opportunities. In: Humphreys J, Little S, editors. 554Challengesin Estuarine and Coastal Science: Estuarine and Coastal Sciences Association50th 555Anniversary Volume. UK: Pelagic Publishing; 2021.55629.Scott J, Pontee N, McGrath T, Cox R, Philips M. Delivering Large Habitat Restoration 557Schemes: Lessons from the Steart Coastal Management Project. Coastal Management: Changing 558coast, changing climate, changing minds: ICE Publishing; 2016. p. 663-74.55930.British Geological Society. Geology of Britain [cited 2021 21 April]. Available from: 560https://mapapps.bgs.ac.uk/geologyofbritain/home.html.56131.Pontee N, Serato B. Nearfield erosion at the steart marshes (UK) managed realignment 562scheme following opening. Ocean & Coastal Management. 2019;172:64-81.56332.UK Hydrographic Office. Admiralty Tide TablesVolume 1: United Kingdom and Ireland 564(Including European Channel Ports). Taunton, UK: The United Kingdom Hydrographic Office; 2010.56533.Pontee NI. Impact of managed realignment design on estuarine water levels.

Proceedings of 566the Institution of Civil Engineers -Maritime Engineering. 2015;168(2):48-61.56734.Rowell DL. Soil science: Methods & applications: Routledge; 2014.56835.Sparkes RB, Lin I-T, Hovius N, Galy A, Liu JT, Xu X, et al. Redistribution of multi-phase 569particulate organic carbon in a marine shelf and canyon system during an exceptional river flood: 570.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

3. Effects of Typhoon Morakot on the Gaoping River–Canyon system. Marine Geology. 2015;363:191-571201. doi: https://doi.org/10.1016/j.margeo.2015.02.013.57236.Defra. LiDAR Composite DTM -0.5 m. Open Government Licence v3.0 573https://environment.data.gov.uk/DefraDataDownload/?Mode=survey2020[25 January 2021].57437.R Development Core Team. R: A language and environment for statistical computing. 3.5.0 575ed. Vienna: R Foundation for Statistical Computing; 2018.57638.Hijmans RJ. raster: Geographic Data Analysis and Modeling. R package version 3.3-6. 2020.57739.Environment Agency. Eric carbon planning tool training package: 578https://www.ericenvironmentagency.co.uk/story_html5.html?lms=1[cited 2021 08/10/2021].57940.Gulliver A, Carnell PE, Trevathan-Tackett SM, Duarte de Paula Costa M, Masqué P, 580Macreadie PI. Estimating the Potential Blue Carbon Gains From Tidal Marsh Rehabilitation: A Case 581Study From South Eastern Australia. Frontiers in Marine Science. 2020;7:403.58241.Ranwell DS. Spartina salt marshes in southern England: II. Rate and seasonal pattern of 583sediment accretion. The Journal of Ecology.

1964:79-94.58442.Allen JRL, Duffy MJ. Medium-term sedimentation on high intertidal mudflats and salt 585marshes in the Severn Estuary, SW Britain: the role of wind and tide. Marine Geology. 1998;150(1-5864):1-27.58743.Allen JRL, Duffy MJ. Temporal and spatial depositional patterns in the Severn Estuary, 588southwestern Britain: intertidal studies at spring–neap and seasonal scales, 1991–1993. Marine 589Geology. 1998;146(1-4):147-71.59044.Brown SL, Pinder A, Scott L, Bass J, Rispin E, Brown S, et al. Wash Banks Flood Defence 591Scheme Freiston Environmental Monitoring 2002-2006. Report to Environment Agency, 592Peterborough. Centre for Ecology and Hydrology, Dorset, UK: 2007.59345.Garbutt A. Bed level change within the Tollesbury managed realignment site, Blackwater 594estuary, Essex, UK between 1995 and 2007. NERC Environmental Information Data Centre; 2018.59546.Spencer T, Friess DA, Möller I, Brown SL, Garbutt RA, French JR. Surface elevation change in 596natural and re-created intertidal habitats, eastern England, UK, with particular reference to Freiston 597Shore. Wetlands Ecology and Management. 2012;20(1):9-33. doi: 10.1007/s11273-011-9238-y.59847.Liu Z, Fagherazzi S, Cui B. Success of coastal wetlands restoration is driven by sediment 599availability. Communications Earth & Environment. 2021;2(1):1-9.60048.Archer AW. World's highest tides: Hypertidal coastal systems in North America, South 601America andEurope. Sedimentary Geology. 2013;284-285:1-25. doi:602https://doi.org/10.1016/j.sedgeo.2012.12.007.60349.Thorn MFC, Burt TN. Sediments and metal pollutants in a turbid tidal estuary. Canadian 604Journal of Fisheries and Aquatic Sciences. 1983;40(S1):s207-s15.60550.Mantz PA, Wakeling HL. Aspects of sediment movement near to Bridgwater Bay bar, Bristol 606Channel. Proceedings of the Institution of Civil Engineers. 1982;73(1):1-23.60751.Darbyshire EJ, West JR.

Turbulence and cohesive sediment transport in the Parrett estuary. 608Turbulence: Perspectives on Flow and Sediment Transport Wiley, Chichester. 1993:215-47.60952.Manning AJ, Langston WJ, Jonas PJC. A review of sediment dynamics in the Severn Estuary: 610Influence of flocculation. Marine Pollution Bulletin. 2010;61(1):37-51. doi: 611https://doi.org/10.1016/j.marpolbul.2009.12.012.61253.French JR. Numerical simulation of vertical marsh growth and adjustment to accelerated 613sea-level rise, North Norfolk, U.K. Earth Surface Processes and Landforms. 1993;18(1):63-81. doi: 614https://doi.org/10.1002/esp.3290180105.61554.Spearman J. The development of a tool for examining the morphological evolution of 616managed realignment sites. Continental Shelf Research. 2011;31(10):S199-S210.61755.Clapp J. Managed realignment in the Humber estuary: factors influencing sedimentation. 6182009.Unpublished PhD thesis, University of Hull.619.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

4. 56.Spencer KL, Carr SJ, Diggens LM, Tempest JA, Morris MA, Harvey GL. The impact of pre-620restoration land-use and disturbance on sediment structure, hydrology and thesediment 621geochemical environment in restored saltmarshes.Science of the Total Environment.2017;587:47-58.62257.Blackwell MSA, Yamulki S, Bol R. Nitrous oxide production and denitrification rates in 623estuarine intertidal saltmarsh and managed realignment zones. Estuarine, Coastal and Shelf Science. 6242010;87(4):591-600.62558.Chen J, Wang D, Li Y, Yu Z, Chen S, Hou X, et al. The carbon stock and

sequestration rate in 626tidal flats from coastal China. Global Biogeochemical Cycles. 2020;34(11):e2020GB006772.62759.Bradfer-Lawrence T, Finch T, Bradbury RB, Buchanan GM, Midgley A, Field RH. The potential 628contribution of terrestrial nature-based solutions to a national 'net zero' climate target. Journal of 629Applied Ecology. 2021;n/a(n/a). doi: https://doi.org/10.1111/1365-2664.14003.63060.Pontee N. Accounting for siltation in the design of intertidal creation schemes. Ocean & 631coastal management. 2014;88:8-12.63261.Schuerch M, Spencer T, Temmerman S, Kirwan ML, Wolff C, Lincke D, et al. Future response 633of global coastal wetlands to sea-level rise. Nature. 2018;561(7722):231-4. doi: 10.1038/s41586-018-6340476-5.63562.Met Office. UKCP09: Griddedobservation data sets. 2009.63663.Emmer I, Needelman B, Emmett-Mattox S, Crooks S, Megonigal P, Myers D, et al. VM0033 637Methodology for tidal wetland and seagrass restoration. Version 1.0. Verra. Verified Carbon 638Standard, 2015.63964.Bischoff J, Sparkes RB, Doğrul Selver A, Spencer RGM, Gustafsson Ö, Semiletov IP, et al. 640Source, transport and fate of soil organic matter inferred from microbial biomarker lipids on the East 641Siberian Arctic Shelf. Biogeosciences. 2016;13(17):4899-914.64265.Saderne V, Geraldi NR, Macreadie PI, Maher DT, Middelburg JJ, Serrano O, et al. Role of 643carbonate burial in Blue Carbon budgets. Nature communications. 2019;10(1):1-9.64466.Centre for Ecology and Hydrology. Land Cover Map 2007 [SHAPE geospatial data], Scale 6451:250000. Updated: 18 July 2008.: EDINA Environment Digimap Service, 646<https://digimap.edina.ac.uk>; 2007.64767.Environment Agency. Steart Coastal Management Project Environmental Statement: Report 648produced by Halcrow for the Environment Agency. Bristol, UK: Environment Agency; 2011. p. 178pp64968.Getmapping. High Resolution (25cm)

Vertical Aerial Imagery [JPG geospatial data], Scale 6501:500, Updated: 25 October 2014. EDINA Aerial Digimap Service, https://digimap.edina.ac.uk; 2014.65169.Burden A, Garbutt RA, Evans CD, Jones DL, Cooper DM. Carbon sequestration and 652biogeochemical cycling in a saltmarsh subject to coastal managed realignment. Estuarine, Coastal 653and Shelf Science. 2013;120:12-20.65470.Jacobs. Final Far Field Effect & Channel Exit: Review and summary –Note 6. Report prepared 655for the Environment Agency byJacobs. 2019. p. 39pp.65671.Adams CA, Andrews JE, Jickells T. Nitrous oxide and methane fluxes vs. carbon,nitrogen and 657phosphorous burial in new intertidal and saltmarsh sediments. Science of the Total Environment. 6582012;434:240-51.659660661.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

5. Supporting information662Table S1. Field sampling dates and information. Samples highlighted in bold are those selected for 663the quantification of total organic carbon. Access issues prevented sampling at some locations in 664March 2015 and September 2016. We assessed the consequence of the additional uneven sampling 665by removing samples from these two time periods and recalculating themean carbon content in 666newly accreted sediment. The value differed by less than 1% of the original value (i.e. 4.367% vs 6674.372%), so we retain all samples in the data presented in the manuscript. 668Table S2. Summary of the fuel consumption and t.CO2emitted by construction vehicles in the 669construction of Steart Marshes.670Figure S1. Photographs of sampling

areas (Sites A-D).671Figure S2. Relationship between elevation change measured with LiDAR derived-DTMs and in situ 672measurements with pins. In situ measured data (x axis) show difference in elevation between 673December 2014 (3 months after restoration) and March 2017. Left: Compares in situ data to 674elevation changes derived from LiDAR data taken in October 2014 and March 2017, and Right 675compares elevation changes between January 2015 and March 2017. No LiDAR images are available 676for December 2014. Solid lines show a 1:1 relationship and the dashed lines show the actual 677relationship (linear regression) between DTM-derived and in situ measurements (dash lines Left:R2 = 6780.775, P <0.001; Right R2= 0.686, P = 0.002). LiDAR measurements are strongly related to in situ 679measurements and are not systematically biased when sampling periods are more closely matched 680(i.e. Right).681682Figure S3. Cumulative elevation change trajectories of a sample of 1000 DTM pixels.683684Figure S4. Cumulative change in elevation for each LiDAR survey.685.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

6. 686687Figure 1.Design and construction elements of Steart managed realignment, Somerset, UK. a) Land 688use prior to the start of site construction in 2012,and locations of sampling points and the flood 689embankments constructed (new) or modified (raised) during the project; existing embankments that 690remained after the project are also shown.Land use was derived from Centre for Ecology and 691Hydrology Land Cover

Map 2007 [66]and the project environmental statement[67]. Base aerial 692image from 2014 [68].b) Elevations across the site showing design and location of creek network, 693lagoons and islands. The location of the breach is also shown. Elevations based on LiDAR data from 694October 2014[36]. 695696.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

7. 697698Figure 2. Cumulative sedimentation at Steart Marshes calculated from Lidar DTMs. (a) Change in 699elevation (cm) between 13/09/2018 (1470 days since breach) and 31/10/2014 (57 days since 700breach). (b) Cumulative change in elevation over time for individual 50x50 cm pixels. Points show 701median cumulative change for a random sample of 10,000 pixels. Error bars show the interquartile 702range for the same sample of pixels.703704.CC-BY 4.0 International licenseperpetuity. It is made available under apreprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in The copyright holder for thisthis version posted October 12, 2021. ; https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint
8. 705706Figure 3. Proportion of total carbon in soil and sediment samples collected from Steart Marshes 707before and after the restoration of tidal inundation. Soil samples were collectedprior to restoration 708from an area heavily disturbed during construction (site A), an area of pasture (site B), grass ley (site 709C) and arable (site D). ‘New sediment’ are samples of newly accumulated sediments from the 710restored site after restoration,

with data from all locations and time points pooled. Sediment was 711also collected from an adjacent natural saltmarsh. Differing letters denote significant differences in 712the carbon content of sediments between locations ($P < 0.05$).713. https://doi.org/10.1101/2021.10.12.464124doi: bioRxiv preprint

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