**Lower Moors SSSI**

**Topographic Survey: Technical Brief**



**June 2016**

# Report Details

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# Introduction and Objectives

Lower Moors is a wetland site on the island of St. Mary’s, lying within the archipelago of the Isles of Scilly. In Spring 2016, Milestone Environmental completed a scoping study assessing the requirements for increasing understanding of the surface water hydrology. This is with a view to alleviating surface water issues including flooding of the adjacent industrial site; potential water quality issues originating from the waste site; and saline intrusion. A primary recommendation was the completion of a detailed topographic survey to elucidate flow pathways, flow capacities of surface drainage channels and structures, and likely hydro-ecological interactions.

The current document is a brief for the topographic survey, outlining the scope and technical requirement for these works. It includes a brief introduction to the site for context (Section2). Section 3 outlines the detailed technical requirements of the survey work, and outlines the deliverables required by the project.

A detailed topographic survey of both the ditches and the wider area is fundamental to the understanding of any wetland site. From this, calculations will be made to estimate:

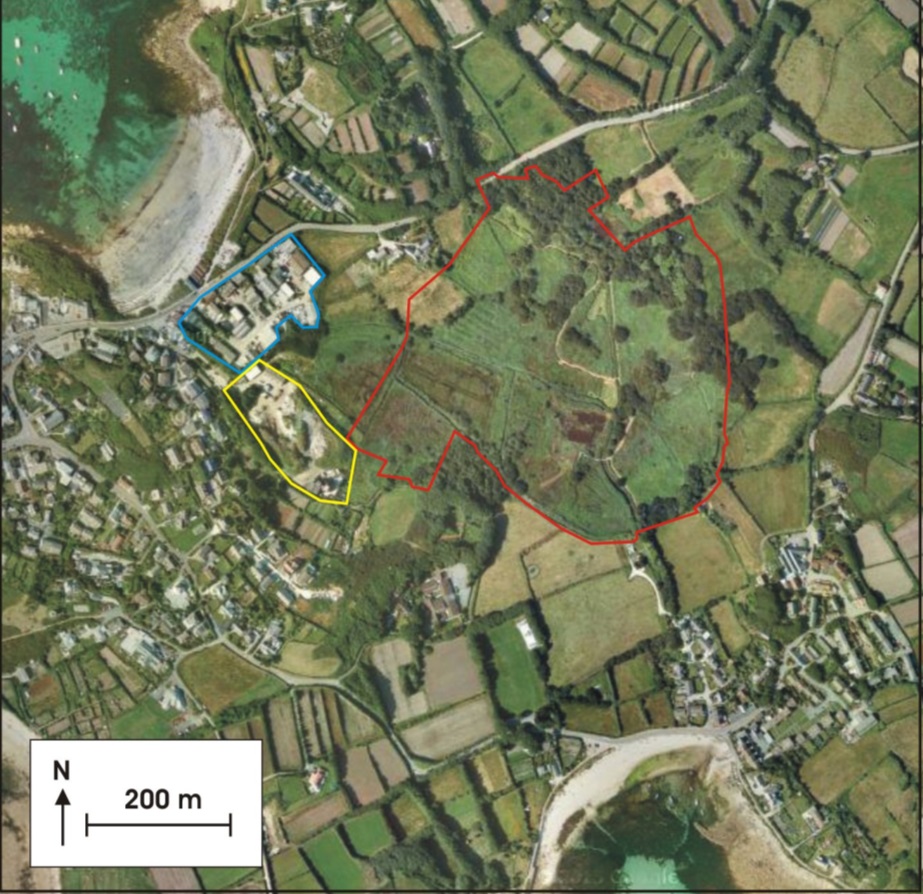
* Areas contributing flow into the central ditch at the top of the site;
* Flow hydraulics through the ditches (central ditch, ring ditches and other minor channels) at given hydraulic gradients within the wetland and adjacent marginal areas;
* Above ground water storage within the wetland at different water levels:
  + Within the ditches
  + Across the wetland surface;
* Assessment of the potential for runoff generation from and the industrial and waste sites, and the potential for storage of this runoff in these sites and the wetland itself;
* Identify transmission pathways for saline intrusion and pollution; and
* Culvert outlet flow at different water levels.

# Site Introduction

## Description

The Lower Moors wetland site is a designated a Site of Special Scientific Interest (SSSI; Natural England, 1976). It lies immediately to the east of Hugh Town on the island of St Mary’s, on the Isles of Scilly. It is 10.2 ha in extent, and the entire site lies at less than 5 maOD. The western boundary is the extent of Hugh Town, buffered only by the island’s waste site. To the northeast, a small industrial estate drains towards the site, beyond which lies Porth Mellon beach. Small areas of pasture lie to the southern fringes, becoming more extensive to the east and northeast. The site boundary is shown in Figure 1, together with the industrial and waste sites. A view of the site from Hugh Town is shown in Figure 2.

The wetland has formed in the ‘bowl’-shaped enclosure formed at the base of the surrounding hillslopes. The drainage from Lower Moors is naturally restricted, and the entire site drains south to the sea at Old Town.



**Figure 1– Satellite image of the site, with site boundary marked in red, industrial site in blue and the waste site in yellow. Map data © 2016 Google; approximate site boundary taken from Natural England (2016)**



**Figure 2–The northern extent of wetland site, looking east from Hugh Town**

## Site Ownership and Responsibilities

The leasehold of the land is held by the Duchy of Cornwall, and the site is leased to and managed by IoSWT. The local unitary authority, CIoS, has responsibility for permitting development and flood management, and thus has a vested interest in effective management; the wetland also lies entirely within the AONB, for which CIoS are responsible. Natural England enforces the protection of designated sites, and thus gives consent for changing management activities. Milestone Environmental have written a scoping study of the surface water management requirements of the site, including completion of a site survey; taking this further they have written the brief for the topographic survey given the knowledge of the site and adjacent areas.

## Access

Vegetation coverage can be dense and thus prevent access: this is considered to be most restrictive in Spring and summer months: overhead vegetation cover may also restrict GPS coverage through the year. A high proportion of the site is likely to be saturated, again making access difficult. This is likely to be least problematic in the late summer.

# Topographic survey Technical Requirement

## Output

Prior to work commencing, the following should be provided:

* Risk assessment outlining perceived operational risks and appropriate mitigation. Known site risks include:
  + Open water;
  + Overhead high voltage power lines;
* Method statement required *before* commencing work, outlining a planned technical approach and logistics.

Upon completion, delivery should be provided of the following within one calendar month:

* Short report, including:
  + Survey conditions;
  + Access problems;
  + Survey coverage;
  + Accuracy of measurements;
* xyz files in csv format and pdf format;
* Lateral locations should be provided using the Ordnance Survey National Grid reference system;
* Vertical elevation should be provided in metres above Ordnance Datum (maOD);
* Map of survey points in pdf and dwg format; and
* Photos of all features surveyed, indexed to features.

## Accuracy

* Lateral accuracy should be to within +/- 5 cm;
* Vertical accuracy should be to within +/- 1 cm

It is appreciated that lateral accuracy is conventionally superior to vertical accuracy. The above are minimum standards required.

## Survey Points Required

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Feature** | **Survey Item** | **Upstream-Downstream Extent** | **Lateral Extent** | **Downstream Points Density/Items** | **Lateral Points Density** | **Notes** |
|  |  |  |  |  |  |  |  |
| *a* | Central Ditch (north-south) | Cross sections | From inlet culvert (Telegraph Rd.) to outlet culvert (to Old Town beach) | 5 m beyond ditch extent | Every 10 m upstream-downstream | 30 cm minimum; at least 15 points |  |
| *b* |  | Long section | " | Single points | Every 10 m upstream-downstream | - | Deepest part of channel |
| *c* | Ring Ditches | Cross sections | Full extent, eastern and western ditches | 2 m beyond ditch extent | Every 10 m upstream-downstream | 30 cm minimum; at least 15 points |  |
| *d* |  | Long section | " | Single points | Every 10 m upstream-downstream | - | Deepest part of channel |
| *e* | Industrial area drainage ditch | Cross sections | Head of ditch (eastern end of Ind. site) to merge into minor ditch network | 2 m beyond ditch extent | Every 10 m upstream-downstream | 30 cm minimum; at least 15 points |  |
| *f* |  | Long section | " | Single points | Every 10 m upstream-downstream | - | Deepest part of channel |
| *g* | Waste site drainage ditch | Cross sections | Head of ditch (by Ind./Waste sites) to merge into minor ditch network | 2 m beyond ditch extent | Every 10 m upstream-downstream | 30 cm minimum; at least 15 points |  |
| *h* |  | Long section | " | Single points | Every 10 m upstream-downstream | - | Deepest part of channel |
| *i* | Minor Ditches (all other channels) | Cross sections | Full extents across site | 2 m beyond ditch extent | Every 10 m upstream-downstream | 30 cm minimum; at least 15 points |  |
| *j* |  | Long sections | Full extents across site | Single points | Every 10 m upstream-downstream | - | Deepest part of channel |
| *k* | Open Water Scrapes | Boundary | Extent of feature | Extent of feature | 2 m spacing around perimeter | - |  |
| *l* |  | Bed profile | Extent of feature | Extent of feature | 5 m grid where possible | - |  |
| *m* |  | Stageboards (if present) | Single point | Single point | At zero stage or recorded datum, and current water level | - |  |
| *n* | Inflow channel (Telegraph Rd) | Cross sections | 3 no. cross sections upstream of Telegraph Rd. culvert | 5 m beyond ditch extent | Every 10 m upstream-downstream | 20 cm minimum; at least 15 points |  |
| *o* |  | Culvert inlet | Single point | Extent of feature | Soffit, invert, channel bed, headwall top & lateral extents | - |  |
| *p* |  | Culvert outlet | Single point | Extent of feature | Soffit, invert, channel bed, headwall top & lateral extents | - |  |
| *q* | Outlet Culvert (to Old Town beach) | Culvert inlet | Single point | Extent of feature | Soffit, invert, channel bed, headwall top & lateral extents | - |  |
| *r* | Stop plank structure | Cross section | Single point | Extent of feature | Lateral and vertical extents | 20 cm minimum; at least 15 points |  |
| *s* | Wider site surface topography | - | Site boundary | Central ditch width | 25 m resolution where possible, any sig. points of inflection/change | 25 m resolution where possible, any sig. points of inflection/change | |
| *t* | Industrial site | Topography | Extent of Industrial site | Extent of Industrial site | 5 m grid; any sig. points of inflection/change | 5 m grid |  |
| *u* |  | Outlet(s) to ditch | Single point(s); locations unknown | Extent of feature(s) | Soffit, invert, channel bed, headwall top & lateral extents | - |  |
| *v* | Waste site | Topography | Extent of Waste site | Extent of Waste site | 5 m grid; any sig. points of inflection/change | 5 m grid |  |
| *w* |  | Outlet(s) to ditch | Single point; southeast of site; plus drain covers | Extent of feature(s) | Soffit, invert, channel bed, headwall top & lateral extents | - |  |
| *x* | Path | Long section | Inlet culvert (Telegraph Rd.) to outlet culvert (to Old Town beach) | Single point | Every 10 m upstream-downstream | Single point |  |
| *y* | Existing well heads | As found | Single points; some locations known | - | Remove caps if possible | - |  |
| *z* | New well heads | Dialogue with installer | Single points | - | - | - | Timed after installation of wells |
| *aa* | Local OS benchmark | - | - | - | - | - | For cross referencing OS datum |