

Welsh Government

M4 Corridor around Newport

Environmental Statement Volume
3:

Appendix 10.14 Aquatic
Macrophyte Survey 2014

M4CaN-DJV-EBD-ZG_GEN-AX-EN-0033

At Issue | March 2016

M4 CORRIDOR AROUND NEWPORT,
SOUTH WALES

BASELINE AQUATIC MACROPHYTE
SURVEY
2014



**RACHEL
HACKING
ECOLOGY**

52 Church Lane, Marple, Stockport, Cheshire, SK6 7AW

Tel: 0161 427 3548 Mobile: 07734 296424

mail@rachelhackingecology.co.uk www.rachelhackingecology.co.uk

CONTENTS

1. INTRODUCTION	Page 2
2. METHODOLOGY	3
3. RESULTS	5
4. SUMMARY AND RECOMMENDATIONS	46
REFERENCES	47
APPENDIX 1 - RAW SURVEY DATA	
APPENDIX 2 - TERRESTRIAL SPECIES LISTS	
SURVEY SITE LOCATIONS	

1. INTRODUCTION

- 1.1 Rachel Hacking Ecology Limited was commissioned in 2014 by Ove Arup & Partners Limited to undertake a baseline aquatic macrophyte survey of a proposed new route for the M4 motorway south of Newport in south Wales.
- 1.2 The proposed route runs from Junction 23 of the existing M4 in the east to close to Junction 29 of the M4 in the west. It will provide a quicker travel route by bypassing Newport. The route includes many areas of farmland, ex-industrial land and a number of statutorily and non-statutorily protected sites, such as Sites of Special Scientific Interest (SSSIs) within an area known as the Gwent Levels. The Gwent Levels are renowned for their aquatic flora.
- 1.3 The centreline of the study area, within a 50 metre corridor, was surveyed for its botanical interest, within suitable habitat. The survey concentrated on habitats such as reens, ditches, ex-industrial land, woodland, permanent pasture, ponds, grazing marsh and streams.
- 1.4 The aquatic macrophyte survey was commissioned to determine the plant species assemblages present along the potential route of the M4 and whether any species of conservation concern exist within the study area. The baseline results will inform the need for further survey and provide baseline information for an Environmental Impact Assessment of any scheme. In time, the results will feed into the mitigation and compensation package.

2. METHODOLOGY

- 2.1 Detailed maps were studied to determine survey sites. There are approximately 100 sites, mainly watercourses or waterbodies, which will be affected by the potential route. Due to timing considerations, 50% of the sites were chosen for survey. The sites were chosen either from access availability or from ground work i.e. visiting the sites and deciding which to survey.
- 2.2 At each suitable site, sampling methodology followed that of the *Countryside Council for Wales Guidance Note 2: Flora Monitoring on the Gwent Levels Sites of Special Scientific Interest September 1996*.
- 2.3 A 20 metre section of the site was chosen and the following parameters recorded:
- water depth
 - turbidity (on a 1-5 scale; 1 = clear, 5 = turbid)
 - water flow and direction
 - ditch width
 - bank alignment, depth and slope
 - nature of bank vegetation
 - adjacent land use
 - presence/absence of: fencing, stock trampling, stock grazing, hedging, hedge height
 - % shade from woody vegetation (trees and hedges only)
 - ditch and bank management
 - % vegetation cover from submerged, floating, emergent and bank species
- 2.4 All plant species within the water were recorded, as well bank species. A grapnel was used to sample submerged vegetation. A number of dips with the grapnel were made.
- 2.5 Rachel Hacking and Andy Harmer undertook the field work. Three visits were made, in May, July and September 2014. Identification was made in the field unless a specimen of the plant needed to be taken away for critical identification, for example, using a microscope. In this case, a specimen of the plant was bagged and labelled.
- 2.6 Plants were identified by Rachel Hacking PhD, a botanical specialist.
- 2.7 Each plant species was assessed for current rarity designations, such as Red Data Book, Nationally Scarce and/or Species of Principal Importance in Wales (Section 42 of the NERC Act 2006).
- 2.8 Botanical nomenclature follows Stace, 2010.

Survey Constraints

- 2.9 Few constraints existed to any of the botanical survey visits. Some reens were difficult to access for the whole 20 metre stretch due to dense vegetation and/or steep banks.

3. RESULTS

GENERAL

- 3.1 A total of 81 species of aquatic macrophyte were recorded from the ditches, reens and ponds across the study site. All plants were recorded where they were rooted below the high water mark. In some cases, this included tree or grass species. The majority of the plant species recorded are common throughout the UK.
- 3.2 One species was recorded from the study site which is a NERC Act 2006 Section 42 species (a species of Principal Importance in Wales), is listed on the UK Biodiversity Action Plan and is listed under the IUCN rarity criteria as 'Vulnerable' (a taxon is listed as Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future). This was Tubular Water-dropwort *Oenanthe fistulosa*.
- 3.3 The site descriptions are presented below. The site locations can be found at the back of the report. The raw data is presented in Appendix 1.

Site 1 - Neways Reen

- 3.4 Site 1 is Neways Reen, located on the eastern border of the Tata Steel land (see Photograph 1), within the Gwent Levels - Whitson SSSI. Table 1 details the parameters recorded at the site.

Table 1. Site 1 Data	
Water depth (m)	5
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, north
Ditch width (m)	4
Bank alignment, depth and slope	NW-SE, 1 metre, 90°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	On west bank only - 3 metres
% shade from tree and hedges	10%
Ditch and bank management	None
% vegetation cover per type	Emergent 60%, floating 10%, submerged 80%

- 3.5 A total of 23 species of aquatic macrophyte were recorded here (see Appendix 1), including emergent vegetation such as Lesser Water-parsnip *Berula erecta*, Common Spike-rush *Eleocharis palustris*, Pink Water-speedwell *Veronica catenata*, Arrowhead *Sagittaria sagittifolia* and Brooklime *Veronica beccabunga*. A number of floating species occur here including Greater Duckweed *Spirodella polyrrhiza*, Frogbit *Hydrocharis morsus-ranae* and Ivy-leaved Duckweed *Lemna trisulca*. Submerged vegetation includes Rigid Hornwort *Ceratophyllum demersum* and Curly Pondweed *Potamogeton crispus*. The Red Data Book species Tubular Water-dropwort *Oenanthe fistulosa* occurs here.



Photograph 1 - Site 1

Site 2

- 3.6 Site 2 is a shaded, shallow ditch which lies within the Gwent Levels - Redwick and Llandeenny SSSI. A large Crack Willow *Salix fragilis* tree has fallen over the ditch. Table 2 details the ditch.

Table 2. Site 2 Data	
Water depth (m)	0.4
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	0.8
Bank alignment, depth and slope	NE-SW, 0.2 metres deep, 15° slope
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	80
Ditch and bank management	N
% vegetation cover per type	Floating 40%, emergent 30%, bank vegetation 95%

- 3.7 A total of 6 species of aquatic macrophyte were recorded here. This includes emergent species such as Water Mint *Mentha aquatica* and Celery-leaved Buttercup *Ranunculus sceleratus*. Floating vegetation comprises of Common Duckweed *Lemna minor*.

Site 3 - Middle Road Reen

- 3.8 Middle Road Reen is a wide, deep reen with steep banks (see Photograph 2). The banks are well vegetated, making access to the reen difficult in places. Middle Road Reen is located within the Tata Steel site and lies within the Gwent Levels - Whitson SSSI. Table 3 details the reen.

Table 3. Site 3 Data	
Water depth (m)	5
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	4
Bank alignment, depth and slope	NE-SW, 2 metres, 180°
Bank vegetation	Tall, lush vegetation (mainly <i>Oenanthe crocata</i>)
Adjacent land use	Disused ex-industrial
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Submerged 70%, floating 20%, emergent 40%, bank vegetation 100%

- 3.9 A total of 12 species of aquatic macrophyte were recorded from Site 3. This includes the emergent species Great Willowherb *Epilobium hirsutum*, Reed Sweet-grass *Glyceria maxima*, Amphibious Bistort *Persicaria amphibia* and Hemlock Water-dropwort *Oenanthe crocata*. Floating vegetation includes Frogbit *Hydrocharis morsus-ranae*, Common Duckweed *Lemna minor* and Greater Duckweed *Spirodella polyrhiza*. Submerged vegetation includes Spiked Water-milfoil *Myriophyllum spicatum* and Small Pondweed *Potamogeton berchtoldii*. Small pockets of filamentous algae occur at this reen.



Photograph 2 – Site 3

Site 4 – Elver Pill Reen

- 3.10 Elver Pill Reen is a narrow, deep reen, located within the Tata Steel site (see Photograph 3), within the Gwent Levels - Whitson SSSI. Table 4 details the reen.

Table 4. Site 4 Data	
Water depth (m)	2
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NW-SE, 0.2 metres, 45°
Bank vegetation	Ruderal vegetation
Adjacent land use	Ex-industrial land
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 70%, floating 20%, submerged 60%

- 3.11 A total of 7 species of aquatic macrophyte were recorded from Site 4. The ditch is dominated by Common Reed *Phragmites australis*. Other vegetation includes floating Ivy-leaved Duckweed *Lemna trisulca* and Common Duckweed *Lemna minor*. Submerged vegetation is limited to Spiked Water-milfoil *Myriophyllum spicatum*. Filamentous algae occurs at this reen.



Photograph 3 – Site 4

Site 5

- 3.12 Site 5 is a wide reyn which runs parallel to North Row (road) off the A4810 (see Photograph 4) and lies within the Gwent Levels - Redwick and Llandeenny SSSI . It is connected to Sites 3 and 4. Table 5 details this site.

Table 5. Site 5 Data	
Water depth (m)	3
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Slow, unknown
Ditch width (m)	4
Bank alignment, depth and slope	N-S, 0.5 metres, 45°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 20%, submerged 60%, floating 30%

- 3.13 A total of 32 species of aquatic macrophyte were recorded from Site 5. This is the greatest number of species found at any site across the study area. Emergent vegetation includes Greater Pond-sedge *Carex riparia*, Water Mint *Mentha aquatica*, Water Dock *Rumex hydrolapathum*, Wild Angelica *Angelica sylvestris*, Cyperus Sedge *Carex pseudocyperus*, Marsh Thistle *Cirsium palustre*, Marsh Bedstraw *Galium palustre* and Arrowhead *Sagittaria sagittifolia*. The Red Data Book species Tubular Water-dropwort *Oenanthe fistulosa* occurs here. Floating vegetation includes Greater Duckweed *Spirodela polyrhiza* and Common Duckweed *Lemna minor*. Submerged

vegetation includes Nuttall's Waterweed *Elodea nuttallii*, Common Water-starwort *Callitriche stagnalis* and Rigid Hornwort *Ceratophyllum demersum*.



Photograph 4 - Site 5

Site 6

- 3.14 Site 6 is a narrow, deep reen which runs adjacent to the A4810, close to Meadow Farm, within the Gwent Levels - Redwick and Llandeenny SSSI. The banks are steep and well vegetated (see Photograph 5). An algal scum lay on the surface of the water on every survey visit. Table 6 details this reen.

Table 6. Site 6 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	5
Water flow and direction	Slow, east
Ditch width (m)	1.5
Bank alignment, depth and slope	NE-SW, 2 metres, 180°
Bank vegetation	Ruderal vegetation
Adjacent land use	Grazed pasture and main road
Fenced	Y
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	Dredging
% vegetation cover per type	Emergent 60%, floating 20%

- 3.15 A total of 11 species of aquatic macrophyte were recorded from Site 6. This includes emergent vegetation such as Water Dock *Rumex hydrolapathum*, Yellow Flag *Iris pseudacorus* and Lesser Pond-sedge *Carex acutiformis*. Floating vegetation includes Frogbit *Hydrocharis morsus-ranae*, Common Duckweed *Lemna minor* and Greater Duckweed *Spirodella polyrhiza*.



Photograph 5 - Site 6

Site 7 - Tata Steel land

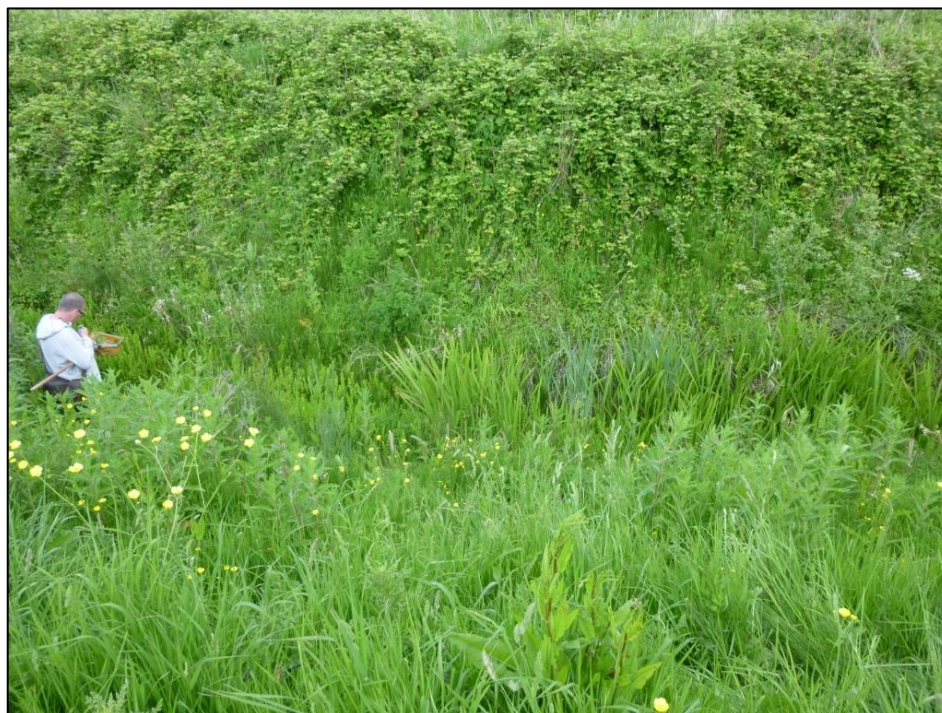
- 3.16 Site 7 is the ex-industrial land owned by Tata Steel. This is purely a terrestrial site, surveyed for terrestrial invertebrates. A botanical species list was taken and is presented in Appendix 2.

Site 8

- 3.17 Site 8 is a narrow ditch situated adjacent to Monk's Drain (see Photograph 6). The ditch is well vegetated. Table 7 details this site.

Table 7. Site 8 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	N-S, 1 metre, 90°
Bank vegetation	Tall grassland
Adjacent land use	Tall grassland, unused
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 100%

- 3.18 A total of 7 species of aquatic macrophyte were recorded from Site 8. This includes emergent vegetation such as Water Horsetail *Equisetum fluviatile*, Lesser Water-parsnip *Berula erecta*, Branched Bur-reed *Sparganium erectum* and Hard Rush *Juncus inflexus*.



Photograph 6 – Site 8

Site 9 - Black Wall

- 3.19 Site 9 is Black Wall reen, which is situated on the western side of Monk's Drain (see Photograph 7), within the Gwent Levels Nash and Goldcliff SSSI. It is botanically species-poor and similar to Site 8. Table 8 details this site.

Table 8. Site 9 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	NE-SW, 1 metre, 90°
Bank vegetation	Tall grassland
Adjacent land use	Tall grassland, unused
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 60%, submerged 60%

- 3.20 A total of 7 species of aquatic macrophyte were recorded from Site 9. Submerged vegetation comprises of Rigid Hornwort *Ceratophyllum demersum*. Emergent vegetation includes Branched Bur-reed *Sparganium erectum*, Yellow Flag *Iris pseudacorus*, Reed Canary-grass *Phalaris arundinacea* and Hemlock Water-dropwort *Oenanthe crocata*.



Photograph 7 – Black Wall reen

Site 10

- 3.21 Site 10 is a reën within the land behind the 'Air Products' factory. The whole of this land is criss-crossed with species-poor polluted reëns. Table 9 details this reën.

Table 9. Site 10 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	5
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	E-W, 0.5 metres depth, 90°
Bank vegetation	Nil
Adjacent land use	Disused ex-industrial
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	None
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 95%

- 3.22 A total of 2 species of aquatic macrophyte were recorded from Site 10. This includes Common Reed *Phragmites australis* (see Photograph 8) with Greater Willowherb *Epilobium hirsutum*.



Photograph 8 – Site 10

Site 11

- 3.23 Site 11 is a ditch which lies just north of the disused laboratory site (see Photograph 9). Table 10 details the site.

Table 10. Site 11 Data	
Water depth (m)	0.8
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	1.5
Bank alignment, depth and slope	N-S, 0.1 metres depth, 15°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	Y, 2 metres
% shade from tree and hedges	70%
Ditch and bank management	None
% vegetation cover per type	Emergent 60 %, floating 10%

- 3.24 A total of 10 species of aquatic macrophyte were recorded at Site 11. This includes emergent vegetation such as Common Spike-rush *Eleocharis palustris*, Water-plantain *Alisma plantago-aquatica* and Floating Sweet-grass *Glyceria fluitans*. Floating vegetation includes Common Duckweed *Lemna minor*. Parsley Water-dropwort *Oenanthe lachenalii* occurs here.



Photograph 9 – Site 11

Site 12

- 3.25 Site 12 is a mainly shaded, narrow ditch, covered in tall vegetation (see Photograph 10), within the Gwent Levels - Nash and Goldcliff SSSI. Small stretches of the ditch are unshaded. Table 11 details this site.

Table 11. Site 12 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	NE-SW, 0.2 metres, 45°
Bank vegetation	Tall grass
Adjacent land use	Grazed pasture
Fenced	Y
Stock trampling	N
Stock grazing	N
Hedging and hedge height	Y, 1.8 metres
% shade from tree and hedges	80%
Ditch and bank management	None
% vegetation cover per type	Emergent 95%, floating 5%

- 3.26 A total of 14 species of aquatic macrophyte were recorded from Site 12. This includes emergent vegetation such as Common Reed *Phragmites australis*, Hairy Sedge *Carex hirta*, Yellow Flag *Iris pseudacorus*, Greater Pond-sedge *Carex riparia*, Gipsywort *Lycopus europaeus* and Marsh Bedstraw *Galium palustre*. Floating vegetation includes Common Duckweed *Lemna minor* and Least Duckweed *Lemna minuta*.



Photograph 10 – Site 12

Site 13

- 3.27 Site 13 is a shallow ditch (see Photograph 11), within the Gwent Levels - Nash and Goldcliff SSSI. The ditch is covered in vegetation, with the odd pocket of open water. Table 12 details Site 13.

Table 12. Site 13 Data	
Water depth (m)	0.8
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	1.5
Bank alignment, depth and slope	NE-SW, 0.3 metres, 45°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	Y, 1.8 metres
% shade from tree and hedges	70%
Ditch and bank management	None
% vegetation cover per type	Emergent 70%, floating 15%

- 3.28 A total of 13 species of aquatic macrophyte were recorded from Site 13. This includes emergent vegetation such as Greater Pond-sedge *Carex riparia*, Fool's-water-cress *Apium nodiflorum*, Celery-leaved Buttercup *Ranunculus sceleratus* and Soft Rush *Juncus effusus*. Floating vegetation includes Common Duckweed *Lemna minor* and Least Duckweed *Lemna minuta*.



Photograph 11 – Site 13

Site 14

- 3.29 Site 14 is a shallow ditch (see Photograph 12), within the Gwent Levels - Nash and Goldcliff SSSI. The majority of the ditch is shaded apart from at a land bridge, which is where the survey took place. Table 13 details the site.

Table 13. Site 14 Data	
Water depth (m)	0.5
Turbidity (1 = clear, 5 = turbid)	1
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NE-SW, 0.2 metres, 45°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	Y (except at land bridge)
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	Y, 2 metres
% shade from tree and hedges	80%
Ditch and bank management	None
% vegetation cover per type	Emergent 95%

- 3.30 A total of 6 species of aquatic macrophyte were recorded at Site 14. Vegetation includes Water Forget-me-not *Myosotis scorpioides*, Hard Rush *Juncus inflexus*, Lesser Water-parsnip *Berula erecta*, Cuckooflower *Cardamine pratensis* and Reed Sweet-grass *Glyceria fluitans*.



Photograph 12 – Site 14

Site 15 - Julian's Reen

- 3.31 Julian's Reen is a wide reen, situated next to a farm track (see Photograph 13), within the Gwent Levels - Nash and Goldcliff SSSI. Table 14 details Site 15.

Table 14. Site 15 Data	
Water depth (m)	2
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	2.5
Bank alignment, depth and slope	N-S, 0.5 metres, 90°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	Y, 0.5 metres
% shade from tree and hedges	10%
Ditch and bank management	None
% vegetation cover per type	Emergent 5%, floating 95%

- 3.32 A total of 10 species of aquatic macrophyte were recorded from Site 15. The water is completely covered in Common Duckweed *Lemna minor* and Greater Duckweed *Spirodela polyrhiza*. Emergent vegetation includes Lesser Pond-sedge *Carex acutiformis*, Water Figwort *Scrophularia auriculata* and Yellow Flag *Iris pseudacorus*.



Photograph 13 – Site 15

Site 16

- 3.33 Site 16 is a wide reën running by the side of a track leading to New Dairy Farm (see Photograph 14), within the Gwent Levels - St. Brides SSSI. Table 15 details this site.

Table 15. Site 16 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	NW-SE, 1 metre, 90°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture and farm track
Fenced	N
Stock trampling	Y - west bank only
Stock grazing	Y - west bank only
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 80%, floating 10%

- 3.34 A total of 15 species of aquatic macrophyte were recorded from Site 16. The vegetation exists in dense clusters, fragmented by stretches of open water. Emergent species include Water-cress *Nasturtium officinale*, Lesser Water-parsnip *Berula erecta*, Reed Canary-grass *Phalaris arundinacea* and Marsh Woundwort *Stachys palustris*. Floating species include Frogbit *Hydrocharis morsus-ranae* and Broad-leaved Pondweed *Potamogeton natans*.



Photograph 14 – Site 16

Site 17

- 3.35 Site 17 is a where two ditches meet, within the Gwent Levels - St. Brides SSSI. This corner ditch is narrow and shallow (see Photograph 15). Table 16 details the site.

Table 16. Site 17 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NE-SW, 0.2 metres, 30°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y - south bank only
Stock grazing	Y - south bank only
Hedging and hedge height	Y - north bank only, 1 metre
% shade from tree and hedges	10%
Ditch and bank management	None
% vegetation cover per type	Emergent 90%, floating 5%

- 3.36 A total of 4 species of aquatic macrophyte were recorded within Site 17. The ditch is covered in Reed Sweet-grass *Glyceria maxima* with patches of Common Reed *Phragmites australis*. Floating species comprise of Least Duckweed *Lemna minuta*.



Photograph 15 – Site 17

Site 18

- 3.37 Site 18 is a narrow ditch which is connected to Site 16 (see Photograph 16), within the Gwent Levels - St. Brides SSSI. The ditch has emergent vegetation on the edges and a small amount of open water in the centre. Table 17 details the site.

Table 17. Site 18 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	1
Bank alignment, depth and slope	NE-SW, 1 metre, 90°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 85%, floating 10%

- 3.38 A total of 13 species of aquatic macrophyte were recorded from Site 18. Emergent vegetation includes Hairy Sedge *Carex hirta*, Marsh Woundwort *Stachys palustris*, Common Reed *Phragmites australis*, Lesser Water-parsnip *Berula erecta* and Water Horse-tail *Equisetum fluviatile*. Floating vegetation comprises of Frogbit *Hydrocharis morsus-ranae*.



Photograph 16 – Site 18

Site 19

- 3.39 Site 19 lies opposite Old Dairy Reen (Site 20) and runs parallel with it, within the Gwent Levels - St. Brides SSSI (see Photograph 17). The ditch is partially cattle poached. No open water exists. Table 18 details the site.

Table 18. Site 19 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	1
Bank alignment, depth and slope	N-S, 0.8 metres, 90°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	Y - on west bank
Stock trampling	Y - east bank only
Stock grazing	Y - east bank only
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 95%

- 3.40 A total of 11 species of aquatic macrophyte were recorded from Site 19. Emergent vegetation covers the reen and includes Yellow Flag *Iris pseudacorus*, Marsh Bedstraw *Galium palustre*, Branched Bur-reed *Sparganium erectum*, Lesser Pond-sedge *Carex acutiformis*, Water Forget-me-not *Myosotis scorpioides* and Water-pepper *Persicaria hydropiper*. The Red Data Book species Tubular Water-dropwort *Oenanthe fistulosa* occurs here.



Photograph 17 – Site 19

Site 20 - Old Dairy Reen

- 3.41 Site 20 is Old Dairy Reen, a wide reen (see Photograph 18), within the Gwent Levels - St. Brides SSSI. Table 19 details the site.

Table 19. Site 20 Data	
Water depth (m)	2
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	3.5
Bank alignment, depth and slope	N-S, 0.5 metres, 180°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 10%

- 3.42 A total of 13 species of aquatic macrophyte were recorded from Site 20. Emergent vegetation includes Lesser Water-parsnip *Berula erecta*, Water Horse-tail *Equisetum fluvatile*, Flowering-rush *Butomus umbellatus*, Jointed Rush *Juncus articulatus* and Branched Bur-reed *Sparganium erectum*. Floating vegetation includes Common Duckweed *Lemna minor*. Submerged vegetation comprises of Nuttall's Waterweed *Elodea nuttallii*. The Red Data Book species Tubular Water-dropwort *Oenanthe fistulosa* occurs here.



Photograph 18 – Site 20

Site 21 - Percoed Reen

- 3.43 Site 21 runs alongside Green Lane, on the northern boundary of the Gwent Levels - St. Brides SSSI. It is a wide reen with emergent vegetation at the edges and open water in the centre (see Photograph 19). Table 20 details Site 21.

Table 20. Site 21 Data	
Water depth (m)	2
Turbidity (1 = clear, 5 = turbid)	5
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NE-SW, 1.5 metres, 180°
Bank vegetation	Lush, ruderal vegetation
Adjacent land use	Track and disused land
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 10%

- 3.44 A total of 4 species of aquatic macrophyte were recorded from Site 21. Emergent vegetation includes Common Reed *Phragmites australis* and Hemlock Water-dropwort *Oenanthe crocata*. Floating vegetation includes Common Duckweed *Lemna minor* and Greater Duckweed *Spirodela polyrhiza*.



Photograph 19 – Site 21

Site 22

- 3.45 Site 22 is a shaded ditch of poor quality (see Photograph 20), within the Gwent Levels - St. Brides SSSI. A small part could be sampled. Table 21 details this site.

Table 21. Site 22 Data	
Water depth (m)	2
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NE-SW, 0.5 metres, 90°
Bank vegetation	Scrub
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	Y, 3 metres
% shade from tree and hedges	80%
Ditch and bank management	None
% vegetation cover per type	Floating 100%, emergent 5%

- 3.46 A total of 4 species of aquatic macrophyte were recorded from Site 22. The water surface is completely covered in Common Duckweed *Lemna minor* and Greater Duckweed *Spirodela polyrhiza*. Emergent vegetation includes Soft Rush *Juncus effusus* and Lesser Water-parsnip *Berula erecta*.



Photograph 20 – Site 22

Site 23

- 3.47 Site 23 is a shaded ditch of poor quality (see Photograph 21), within the Gwent Levels - St. Brides SSSI. Table 22 details the site.

Table 22. Site 23 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	5
Water flow and direction	Very slow, unknown
Ditch width (m)	1.5
Bank alignment, depth and slope	NW-SE, 0.5 metres, 45°
Bank vegetation	Tall grassland and scrub
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	Y, 3 metres
% shade from tree and hedges	80%
Ditch and bank management	None
% vegetation cover per type	Emergent 30%

- 3.48 A total of 6 species of aquatic macrophyte were recorded from Site 22. Emergent vegetation includes Floating Sweet-grass *Glyceria fluitans*, Reed Canary-grass *Phalaris arundinacea* and Hemlock Water-dropwort *Oenanthe crocata*.



Photograph 21 – Site 23

Site 24

- 3.49 Site 24 is an unshaded ditch, covered in vegetation (see Photograph 22), within the Gwent Levels - St. Brides SSSI. Table 23 details this site.

Table 23. Site 24 Data	
Water depth (m)	0.5 (beneath floating mat of vegetation)
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	1.5
Bank alignment, depth and slope	NW-SE, 1 metre, 180°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture and arable
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 95%, floating 5%

- 3.50 A total of 4 species of aquatic macrophyte were recorded from Site 24. Floating vegetation includes New Zealand Pigmyweed *Crassula helmsii* and Common Duckweed *Lemna minor*. Emergent vegetation includes Reed Sweet-grass *Glyceria maxima* and Bulrush *Typha latifolia*. *Crassula helmsii* is an invasive species, listed on Schedule 9 of The Wildlife & Countryside Act 1981 (as amended).



Photograph 22 – Site 24

Site 25

- 3.51 Site 25 is a large, open pond (see Photograph 23), situated just north of a disused road on the western edge of Newport. Table 24 details Site 25.

Table 24. Site 25 Data	
Water depth (m)	5
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	N/A
Bank depth and slope	2.5 metres, 45°
Bank vegetation	Tall grassland
Adjacent land use	Grassland and scrub
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 50%

- 3.52 A total of 14 species of aquatic macrophyte were recorded within Site 25. The pond supports a mixture of open water and emergent and marginal vegetation, including Lesser Spearwort *Ranunculus flammula*, Water Dock *Rumex hydrolapathum*, Gipsywort *Lycopus europaeus*, Bulrush *Typha latifolia* and Broad-leaved Pondweed *Potamogeton natans*. Submerged vegetation includes New Zealand Pigmyweed *Crassula helmsii* and Nuttall's Waterweed *Elodea nuttallii*.



Photograph 23 – Site 25

Site 26

- 3.53 Site 26 is a small stream (see Photograph 24), which flows into a small pond, close to the disused site of Great Pen-carn. Table 25 details this site.

Table 25. Site 26 Data	
Water depth (m)	0.2
Turbidity (1 = clear, 5 = turbid)	1
Water flow and direction	Moderate, N-S
Bank depth and slope	1 metre, 45°
Bank vegetation	Tall grassland
Adjacent land use	Grassland and scrub
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 80%

- 3.54 A total of 5 species of aquatic macrophyte were recorded within the stream at Site 26. Emergent vegetation includes Floating Sweet-grass *Glyceria fluitans*, Reed Canary-grass *Phalaris arundinacea*, Greater Bird's-foot Trefoil *Lotus pedunculatus* and Hard Rush *Juncus inflexus*.



Photograph 24 – Site 26

Site 27

- 3.55 Site 27 is a small stream of poor quality. The stream is heavily shaded and supports no aquatic vegetation. The stream forms part of Berryhill Farm. Table 26 details the site.

Table 26. Site 27 Data	
Water depth (m)	0.2
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	N-S
Bank depth and slope	0.2 metres, 30°
Bank vegetation	Mud and scrub
Adjacent land use	Grassland
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	Y, 3 metres
% shade from tree and hedges	100%
Ditch and bank management	None
% vegetation cover per type	

- 3.56 The banks of the stream support Bramble *Rubus fruticosus* agg. and Ivy *Hedera helix*.

Site 28

- 3.57 Site 28 is a large, recently created pond (see Photograph 25). The pond is part of a County Wildlife Site. Table 27 details the site.

Table 27. Site 28 Data	
Water depth (m)	4
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	N/A
Bank depth and slope	2 metres, 90°
Bank vegetation	Tall grassland, ruderal vegetation
Adjacent land use	Grassland and scrub
Fenced	N
Stock trampling	Y (horses)
Stock grazing	Y (horses)
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 50%, floating 10%, submerged 60%

- 3.58 A total of 13 species of aquatic macrophyte were recorded from within the pond at Site 28. Emergent vegetation includes Common Spike-rush *Eleocharis palustris*, Bulrush *Typha latifolia*, Water-plantain *Alisma plantago-aquatica*, Hard Rush *Juncus inflexus* and Bittersweet *Solanum dulcamara*. Floating vegetation includes Ivy-leaved Duckweed *Lemna trisulca* and Broad-leaved Pondweed *Potamogeton natans*. Submerged vegetation comprises of Spiked Water-milfoil *Myriophyllum spicatum*.



Photograph 25 – Site 28

Site 29

- 3.59 Site 29 is a large pond (see Photograph 26). It is 80% shaded along its edge by mature trees and scrub. The edges of the pond are deep silt. Table 28 details the site.

Table 28. Site 29 Data	
Water depth (m)	4
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	N/A
Bank depth and slope	0.5 metres, 45°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	75%
Ditch and bank management	None
% vegetation cover per type	Emergent 50%, floating 30%



Photograph 26 – Site 29

- 3.60 A total of 17 species of aquatic macrophyte were recorded from Site 29. Emergent vegetation includes Brooklime *Veronica beccabunga*, Waterplantain *Alisma plantago-aquatica*, Small Sweet-grass *Glyceria declinata*, Remote Sedge *Carex remota* and Tufted Forget-me-not *Myosotis laxa*. Submerged vegetation includes Water Star-wort *Callitriche stagnalis*. Floating vegetation includes Greater Duckweed *Spirodella polyrhiza* and Common Duckweed *Lemna minor*.

Site 30

- 3.61 Site 30 is a stream flowing through an area of wet woodland, close to Sites 29 and 35. Table 29 details this site.

Table 29. Site 30 Data	
Water depth (m)	0.2
Turbidity (1 = clear, 5 = turbid)	1
Water flow and direction	Moderate, N-S
Bank depth and slope	0.1 metre, 45°
Bank vegetation	Bare mud
Adjacent land use	Wet woodland
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	100%
Ditch and bank management	None
% vegetation cover per type	Emergent 20%

- 3.62 The stream supports Brooklime *Veronica beccabunga* and Alder *Alnus glutinosa*.

Site 31 - St. Bride's Brook

- 3.63 Site 31 is St. Bride's Brook, a stream which flows through the village of Magor (see Photograph 27). The substrate comprises of stones and silt. Table 30 details the site.

Table 30. Site 31 Data	
Water depth (m)	0.4
Turbidity (1 = clear, 5 = turbid)	1
Water flow and direction	Moderate, N-S
Stream width (m)	3
Bank depth and slope	2 metre, 90° - 180°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 60%

- 3.64 A total of 18 species of aquatic macrophyte were recorded from Site 31. Submerged vegetation comprises of Canadian Pondweed *Elodea canadensis*. Emergent vegetation is varied and includes Water-cress *Nasturtium officinale*, Wild Angelica *Angelica sylvestris*, Water Mint *Mentha aquatica*, Brooklime *Veronica beccabunga* and Water Figwort *Scrophularia auriculata*.



Photograph 27 – Site 31

Site 32

- 3.65 Site 32 is a ditch which runs on the southern side of the A4810, close to the Tesco distribution centre, within the Gwent Levels - Redwick and Llandeenny SSSI. It lies at the bottom a steep embankment which supports the road (see Photograph 28). Table 31 details this site.

Table 31. Site 32 Data	
Water depth (m)	0.2
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Negligible, unknown
Ditch width (m)	2
Bank alignment, depth and slope	W-E, 4 metres to north - 180°, 0.2 metres to south - 45°
Bank vegetation	Tall grassland and ruderal vegetation
Adjacent land use	Main road and grazed pasture
Fenced	Y
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 100%,

- 3.66 A total of 18 species of aquatic macrophyte were recorded from Site 32. Emergent vegetation includes Hemp-agrimony *Eupatorium cannabinum*, Skullcap *Scutellaria galericulata*, Tufted Forget-me-not *Myosotis laxa*, Fool's Watercress *Apium nodiflorum*, Marsh Bedstraw *Galium palustre*, Skullcap *Scutellaria galericulata* and Common Valerian *Valeriana officinalis*. No floating or submerged vegetation exists at Site 32.



Photograph 28 – Site 32

Site 33

- 3.67 Site 33 lies across a field from Site 32, within the Gwent Levels - Redwick and Llandevenny SSSI. It is a well vegetated ditch and supports areas of open water (see Photograph 29). Table 32 details the site.

Table 32. Site 33 Data	
Water depth (m)	1
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, west
Ditch width (m)	2
Bank alignment, depth and slope	W-E, 0.2 metres, 45°
Bank vegetation	Tall grassland
Adjacent land use	Grazed pasture
Fenced	Y - on southern side
Stock trampling	Y - on northern side
Stock grazing	Y - on northern side
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 60%, floating 10%, submerged 80%

- 3.68 A total of 30 species of aquatic macrophyte were recorded from Site 33. Emergent vegetation includes Reed Sweet-grass *Glyceria maxima*, Water Mint *Mentha aquatica*, Marsh Woundwort *Stachys palustris*, Water-plantain *Alisma plantago-aquatica*, Yellow Flag *Iris pseudacorus* and Celery-leaved Buttercup *Ranunculus sceleratus*. Submerged vegetation comprises of Rigid Hornwort *Ceratophyllum demersum* and Nuttall's Waterweed *Elodea nuttallii*. Floating vegetation includes Frogbit *Hydrocharis morsus-ranae* and Ivy-leaved Duckweed *Lemna trisulca*.



Photograph 29 – Site 33

Site 34

- 3.69 Site 34 lies close to the A4810 roundabout which leads to the Tesco distribution centre, within the Gwent Levels - Redwick and Llandeenny SSSI (see Photograph 30). Access to the water was difficult. Table 33 details the site.

Table 33. Site 34 Data	
Water depth (m)	3
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, east
Ditch width (m)	2.5
Bank alignment, depth and slope	NE-SW, 2 metres, 180°
Bank vegetation	Tall grassland and ruderal vegetation
Adjacent land use	Main road and tree belt
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 80%, floating 10%, submerged 10%

- 3.70 A total of 9 species of aquatic macrophyte were recorded from Site 34. Emergent vegetation includes Common Reed *Phragmites australis*, Hemlock Water-dropwort *Oenanthe crocata*, Tufted Forget-me-not *Myosotis laxa* and Reed Sweet-grass *Glyceria maxima*. Submerged vegetation includes Small Pondweed *Potamogeton berchtoldii*.



Photograph 30 – Site 34

Site 35

- 3.71 Site 35 is an area of semi-improved grassland, which supports a good diversity of flowering plant species. Surveys for terrestrial invertebrates were carried out here. Appendix 2 includes a botanical species list for the site.

Site 36

- 3.72 Site 36 is an area of wet woodland, next to Site 35. Surveys for terrestrial invertebrates were carried out here. Appendix 2 includes a botanical species list for the site.

Site 37

- 3.73 Site 37 is a deep, wide reën, close to the River Ebbw (see Photograph 31), within the Gwent Levels - St. Brides SSSI. It was dredged earlier in the year. Table 34 details the site.

Table 34. Site 37 Data	
Water depth (m)	4
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	NW-SE, 0.5 metres, 90°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture and track
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	Dredging
% vegetation cover per type	Emergent 40%, floating 20%, submerged 70%

- 3.74 A total of 22 species of aquatic macrophyte were recorded from Site 37. Emergent vegetation includes Arrowhead *Sagittaria sagittifolia*, Reed Canary-grass *Phalaris arundinacea*, Flowering-rush *Butomus umbellatus*, Soft Rush *Juncus effusus* and Tufted Forget-me-not *Myosotis laxa*. Floating vegetation includes Frogbit *Hydrocharis morsus-ranae*, Water Fern *Azolla filiculoides* and Ivy-leaved Duckweed *Lemna trisulca*. Submerged vegetation includes Curly Pondweed *Potamogeton crispus*, Rigid Hornwort *Ceratophyllum demersum* and Nuttall's Waterweed *Elodea nuttallii*. The Red Data Book species Tubular Water-dropwort *Oenanthe fistulosa* occurs here.



Photograph 31 – Site 37

Site 38

- 3.75 Site 38 is a narrow ditch of poor quality, within the Gwent Levels - St. Brides SSSI. It is situated on the edge of improved grassland fields. The ditch is heavily shaded on one side by a mature hedgerow (see Photograph 32). Table 35 details the site.

Table 35. Site 38 Data	
Water depth (m)	0.5
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	0.5
Bank alignment, depth and slope	N-S, 0.2 metres, 90°
Bank vegetation	Grassland and scrub
Adjacent land use	Pasture
Fenced	N
Stock trampling	N
Stock grazing	N
Hedging and hedge height	Y 2.5 metres
% shade from tree and hedges	95%
Ditch and bank management	None
% vegetation cover per type	Emergent 20%, floating 100%

- 3.76 A total of 6 species of aquatic macrophyte were recorded from Site 38. Floating vegetation dominates the ditch and includes Common Duckweed *Lemna minor* and Least Duckweed *Lemna minuta*. Emergent vegetation includes Common Reed *Phragmites australis*, Yellow Flag *Iris pseudacorus* and Gipsywort *Lycopus europaeus*.



Photograph 32 – Site 38

Site 39

- 3.77 Site 39 is a narrow, shallow ditch (see Photograph 33), within the Gwent Levels - St. Brides SSSI. Table 36 details this site.

Table 36. Site 39 Data	
Water depth (m)	0.2
Turbidity (1 = clear, 5 = turbid)	2
Water flow and direction	Very slow, unknown
Ditch width (m)	1
Bank alignment, depth and slope	NE-SW, 0.1 metres, 20°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	Y (gappy) 3 metres
% shade from tree and hedges	30%
Ditch and bank management	None
% vegetation cover per type	Emergent 40%, floating 10%, submerged 10%

- 3.78 A total of 11 species of aquatic macrophyte were recorded from Site 39. This includes emergent vegetation such as Lesser Water-parsnip *Berula erecta*, Water-pepper *Persicaria hydropiper* and Lesser Pond-sedge *Carex acutiformis*. Submerged vegetation includes Common Water-starwort *Callitriche stagnalis*. Floating vegetation includes Common Duckweed *Lemna minor*.



Photograph 33 – Site 39

Site 40

- 3.79 Site 40 is a wide ditch which is completely covered in tall vegetation (see Photograph 34), within the Gwent Levels - St. Brides SSSI. Table 37 details this site.

Table 37. Site 40 Data	
Water depth (m)	0.4
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	2
Bank alignment, depth and slope	NE-SW, 0.2 metres, 45°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	Y
Stock trampling	N
Stock grazing	N
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 100%



Photograph 34 – Site 40

- 3.80 A total of 4 species of aquatic macrophyte were recorded from Site 40. Emergent vegetation covers the ditch and includes Bulrush *Typha latifolia* with some Reed Canary-grass *Phalaris arundinacea* and Greater Willowherb *Epilobium hirsutum*.

Site 41 - Disused Laboratory

- 3.81 Site 41 is an area of species-rich ex-industrial land. Surveys for terrestrial invertebrates were carried out here. Appendix 2 includes a botanical species list for the site.

Control Sites

- 3.82 The following four control sites were chosen away from the potential route of the M4 corridor. They will not be directly affected if the M4 is constructed following the Black Route. The sites were chosen for their diversity and to reflect similarities with ditches along the route.

Control Site 1

- 3.83 Control Site 1 is an open ditch (see Photograph 35), within the Gwent Levels - St. Brides SSSI. Table

Table 38. Control Site 1 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	NE-SW, 0.5 metres, 180°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 20%, floating 100%, submerged 50%

- 3.84 A total of 10 species of aquatic macrophyte were recorded from Control Site 1. Floating vegetation dominates the ditch and includes Common Duckweed *Lemna minor* and Greater Duckweed *Spirodela polyrhiza*. Emergent vegetation includes Reed Canary-grass *Phalaris arundinacea*, Lesser Water-parsnip *Berula erecta*, Water Dock *Rumex hydrolapathum* and Soft Rush *Juncus effusus*. Submerged vegetation comprises of Nuttall's Waterweed *Elodea nuttallii*.



Photograph 35 – Control Site 1

Control Site 2

- 3.85 Control Site 2 is a wide, open reën, covered in vegetation (see Photograph 36). Table 39 details the site.

Table 39. Control Site 2 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	N-S, 0.5 metres, 180°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 95%, floating 10%, submerged 50%

- 3.86 A total of 12 species of aquatic macrophyte were recorded from Control Site 2. Emergent vegetation includes Lesser Water-parsnip *Berula erecta*, Marsh Woundwort *Stachys palustris*, Clustered Rush *Juncus conglomeratus* and Branched Bur-reed *Sparganium erectum*. Submerged vegetation includes Nuttall's Waterweed *Elodea nuttallii*. Floating vegetation includes Common Duckweed *Lemna minor* and Least Duckweed *Lemna minuta*.



Photograph 36 – Control Site 2

Control Site 3

- 3.87 Control Site 3 is a shallow ditch which is unshaded (see Photograph 37), within the Gwent Levels - Nash and Goldcliff SSSI. Table 40 details the site.

Table 40. Control Site 3 Data	
Water depth (m)	0.5
Turbidity (1 = clear, 5 = turbid)	3
Water flow and direction	Very slow, unknown
Ditch width (m)	1
Bank alignment, depth and slope	N-S, 0.2 metres, 45°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 45%, floating 10%

- 3.88 A total of 5 species of aquatic macrophyte were recorded from Control Site 3. Emergent vegetation includes Small Sweet-grass *Glyceria declinata*, Hard Rush *Juncus inflexus* and Soft Rush *Juncus effusus*. Floating vegetation comprises of Common Duckweed *Lemna minor*.



Photograph 37 – Control Site 3

Control Site 4

- 3.89 Control Site 4 is a wide, deep reën (see Photograph 38), within the Gwent Levels - Nash and Goldcliff SSSI. Table 41 details the site.

Table 41. Control Site 4 Data	
Water depth (m)	1.5
Turbidity (1 = clear, 5 = turbid)	4
Water flow and direction	Very slow, unknown
Ditch width (m)	3
Bank alignment, depth and slope	N-S, 0.5 metres, 180°
Bank vegetation	Grassland
Adjacent land use	Grazed pasture
Fenced	N
Stock trampling	Y
Stock grazing	Y
Hedging and hedge height	N
% shade from tree and hedges	Nil
Ditch and bank management	None
% vegetation cover per type	Emergent 45%, floating 100%, submerged 50%

- 3.90 A total of 5 species of aquatic macrophyte were recorded from Control Site 4. Floating vegetation includes Common Duckweed *Lemna minor* and Greater Duckweed *Spirodela polyrhiza*. Emergent vegetation includes Reed Sweet-grass *Glyceria maxima*. Submerged vegetation includes Rigid Hornwort *Ceratophyllum demersum*.



Photograph 38 – Control Site 4

4. SUMMARY AND RECOMMENDATIONS

- 4.1 A total of 36 sites, plus 4 control sites, were surveyed for aquatic macrophytes within the study area. Species-richness per site varied from 32 species to 2 species. The Red Data Book Tubular Water-dropwort *Oenanthe fistulosa* was recorded from 5 sites. All other species are common throughout the UK.
- 4.2 Recommendations for future survey work include:
- Surveys of the ditches and ruderal habitats surrounding the M4 toll booth at Rogiet Moor. No access was given in 2014.
 - Consecutive surveys of the species-rich sites covered in 2014. Species-rich sites include those with a good diversity of botanical species (i.e. 12 species or more).

SELECTED REFERENCES

National Biodiversity Network (www.nbn.org.uk)

Recorder 6 Software. (2004). JNCC.

Stace, C. A. (2010). *New Flora of the British Isles*, 3rd Edition. Cambridge University Press.

Vascular Plant Red Data List for Great Britain.

APPENDIX 1 - RAW SURVEY DATA

[illegible]

	SITE NUMBER:	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	31	32	33	34	37	38	39	40	C1	C2	C3	C4			
	No. of species found:	23	6	12	7	32	11	7	7	2	10	14	13	6	10	15	4	13	11	13	4	4	6	4	14	5	13	17	2	18	18	30	9	22	6	11	4	10	12	5	5			
Creeping Bent	<i>Agrostis stolonifera</i>					o			r							o		r					r								lf								o					
Water Mint	<i>Mentha aquatica</i>	o	lf			lf																	r							o		lf												
Tufted Forget-me-not	<i>Myosotis laxa</i>																	r										o			o	o	r	r										
Water Forget-me-not	<i>Myosotis scorpioides</i>												r	r						r																								
Spiked Water-milfoil	<i>Myriophyllum spicatum</i>			lf	r																						la																	
Water-cress	<i>Nasturtium officinale</i>															la												o		o		lf				o								
Hemlock Water-dropwort	<i>Oenanthe crocata</i>	r		lf	lf	la	ld	lf	la			o	lf		lf	o				o	r		r										la					r		r				
Tubular Water-dropwort	<i>Oenanthe fistulosa</i>	r				o														r	r													r										
Parsley Water-dropwort	<i>Oenanthe lachenalii</i>										r																																	
Amphibious bistort	<i>Persicaria amphibia</i>			o																																								
Water-pepper	<i>Persicaria hydropiper</i>																		r												r					o								
Reed Canary-grass	<i>Phalaris arundinacea</i>						lf	lf								la		lf					o								lf				lf		d		la					
Common Reed	<i>Phragmites australis</i>				d	ld			la	d		d	lf				d	d	ld		ld					ld						la	d	la	ld				lf					
Small Pondweed	<i>Potamogeton berchtoldii</i>			r																								r					r	r										
Curly Pondweed	<i>Potamogeton crispus</i>	lf																																										
Broad-leaved Pondweed	<i>Potamogeton natans</i>															lf									lf		la																	
Lesser Spearwort	<i>Ranunculus flammula</i>																								lf		r																	
Celery-leaved Buttercup	<i>Ranunculus sceleratus</i>	o	o										o						r													o												
Water Dock	<i>Rumex hydrolapathum</i>					o	o																	o								o		o				r						
Arrowhead	<i>Sagittaria sagittifolia</i>	o				o										o																			r									
Goat Willow	<i>Salix caprea</i>										o														r		r																	
Grey Willow	<i>Salix cinerea</i>																										r																	
Crack Willow	<i>Salix fragilis</i>		o																																									
Water Figwort	<i>Scrophularia auriculata</i>														o																r													
Skullcap	<i>Scutellaria galericulata</i>					r																										o	r											
Bittersweet	<i>Solanum dulcamara</i>									r	o					o	o	o		r			r					o			r													
Branched Bur-reed	<i>Sparganium erectum</i>	lf						la								la			r	lf					lf			lf		lf		la		la					lf					
Greater Duckweed	<i>Spirodella polyrhiza</i>	lf		lf		lf	lf								a						o	la										la		lf				lf			o			
Marsh Woundwort	<i>Stachys palustris</i>					o										o		r														r							r					
Great Reedmace	<i>Typha latifolia</i>	r																						la	la		ld				ld	la		la			la							
Common Valerian	<i>Valeriana officinalis</i>																														ld													
Brooklime	<i>Veronica beccabunga</i>	lf																										lf	la	lf														
Pink Water-speedwell	<i>Veronica catenata</i>	r																																										

APPENDIX 2 - SPECIES LISTS FOR THE TERRESTRIAL SITES

APPENDIX 2 - SPECIES LISTS FOR TERRESTRIAL SITES

Site 7 - Tata Steel Land - Open, species-rich areas

Scientific Name	Vernacular Name	DAFOR
<i>Dipsacus fullonum</i>	Teasel	LA
<i>Sedum acre</i>	Biting Stonecrop	LA
<i>Hypericum perforatum</i>	Perforate St. John's-wort	LF
<i>Catapodium rigidum</i>	Fern-grass	LF
<i>Lathyrus sylvestris</i>	Narrow-leaved Everlasting-pea	LF
<i>Tripleurospermum inodorum</i>	Scentless Mayweed	O
<i>Leucanthemum vulgare</i>	Ox-eye Daisy	O
<i>Epilobium hirsutum</i>	Great Willowherb	O
<i>Geranium robertianum</i>	Herb-Robert	O
<i>Tussilago farfara</i>	Colt's-foot	O
<i>Dactylis glomerata</i>	Cock's-foot	O
<i>Geranium molle</i>	Dove's-foot Crane's-bill	O
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell	O
<i>Myosotis arvensis</i>	Field Forget-me-not	O
<i>Stellaria media</i>	Chickweed	O
<i>Holcus lanatus</i>	Yorkshire Fog	R
<i>Rubus fruticosus</i> agg.	Bramble	R

Site 35 - Semi-improved Grassland

Scientific Name	Vernacular Name	DAFOR
<i>Cynosurus cristatus</i>	Crested Dog's-tail	A
<i>Holcus lanatus</i>	Yorkshire Fog	LA
<i>Ranunculus repens</i>	Creeping Buttercup	LF
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	LF
<i>Trifolium pratense</i>	Red Clover	LF
<i>Lolium perenne</i>	Perennial Rye-grass	LF
<i>Agrostis stolonifera</i>	Creeping Bent	LF
<i>Senecio jacobaea</i>	Common Ragwort	LF
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	LF
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Cirsium palustre</i>	Marsh Thistle	O
<i>Prunella vulgaris</i>	Selfheal	O
<i>Juncus articulatus</i>	Jointed Rush	O
<i>Agrostis capillaris</i>	Common Bent	O
<i>Vicia sativa</i>	Common Vetch	O
<i>Juncus effusus</i>	Soft Rush	O
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Cerastium fontanum</i>	Common Mouse-ear	O
<i>Trifolium repens</i>	White Clover	O
<i>Rumex acetosa</i>	Common Sorrel	O
<i>Taraxacum officinale</i> agg.	Dandelion	R
<i>Juncus conglomeratus</i>	Compact Rush	R

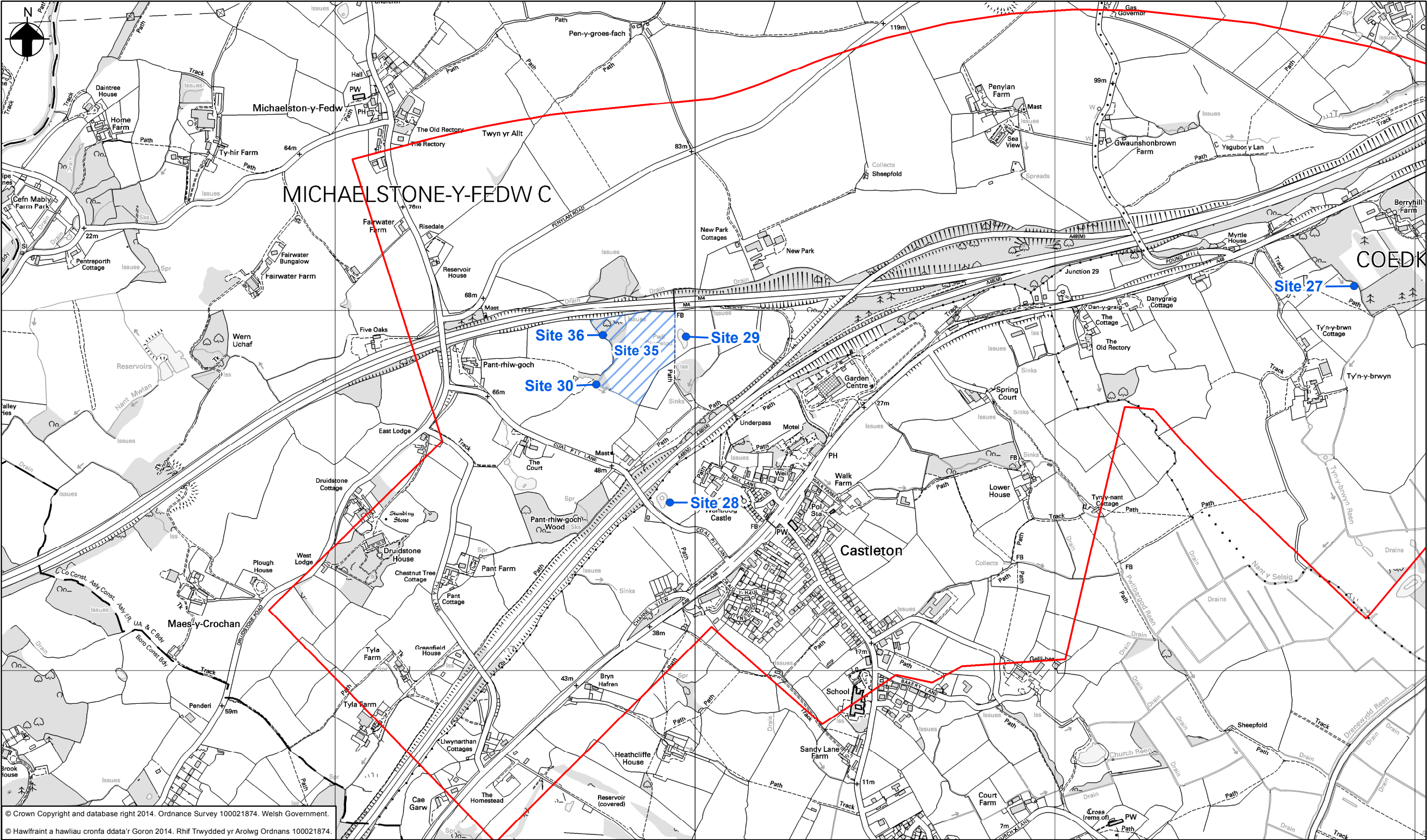
Site 36 - Wet woodland

Scientific Name	Vernacular Name	DAFOR
<i>Alnus glutinosa</i>	Alder	D
<i>Crataegus monogyna</i>	Hawthorn	A
<i>Rubus fruticosus</i> agg.	Bramble	LA
<i>Veronica beccabunga</i>	Brooklime	LA
<i>Ranunculus repens</i>	Creeping Buttercup	LF
<i>Mercurialis perennis</i>	Dog's Mercury	LF
<i>Agrostis stolonifera</i>	Creeping Bent	LF
<i>Urtica dioica</i>	Stinging Nettle	O
<i>Oenanthe crocata</i>	Hemlock Water-dropwort	R

Site 41 - Disused Laboratory

Scientific Name	Vernacular Name	DAFOR
<i>Senecio jacobaea</i>	Common Ragwort	LA
<i>Verbena officinalis</i>	Vervain	LF
<i>Holcus lanatus</i>	Yorkshire Fog	O
<i>Trifolium pratense</i>	Red Clover	O
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	O
<i>Hypericum perforatum</i>	Perforate St. John's-wort	O
<i>Prunella vulgaris</i>	Selfheal	O
<i>Cerastium fontanum</i>	Common Mouse-ear	O
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Plantago major</i>	Greater Plantain	LF
<i>Lolium perenne</i>	Perennial Rye-grass	R
<i>Leucanthemum vulgare</i>	Ox-eye Daisy	O
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	O
<i>Potentilla reptans</i>	Creeping Cinquefoil	O
<i>Agrostis stolonifera</i>	Creeping Bent	O
<i>Lathyrus sylvestris</i>	Narrow-leaved Everlasting-pea	LF
<i>Veronica chamaedrys</i>	Germander Speedwell	O
<i>Centaurium erythraea</i>	Common Centaury	O
<i>Eupatorium cannabinum</i>	Hemp-agrimony	O
<i>Anagallis arvensis</i>	Scarlet Pimpernel	O
<i>Leontodon hispidus</i>	Rough Hawkbit	O
<i>Trifolium campestre</i>	Hop Trefoil	R

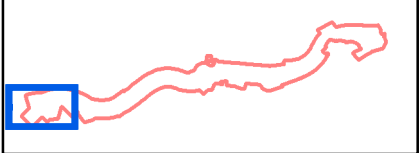
SURVEY SITE LOCATIONS 2014



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

Legend

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



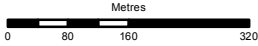
F1	2015-01-30	JE	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd



Llywodraeth Cymru
Welsh Government

Client
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title
M4 Corridor Around Newport
Coridor yr M4 o amgylch Casnewydd



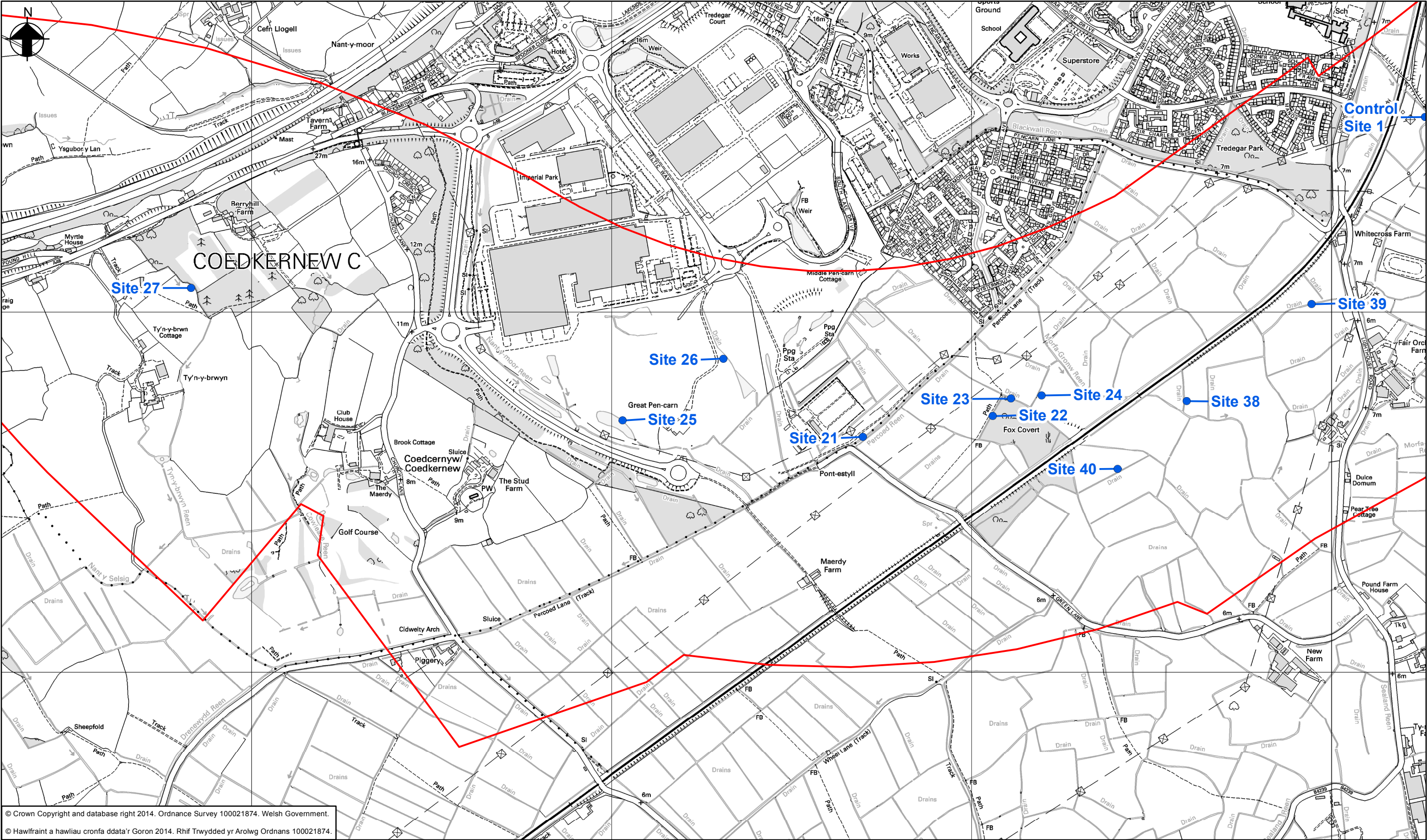
Scale at A3
1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Drawing Title
**Aquatic Macrophytes Sample Locations
Map 1**

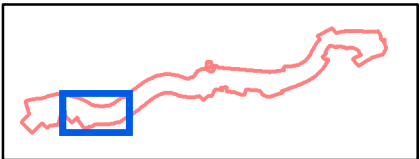
Job No 117300-01	Drawing Status For Issue
Drawing No M4-OA-01-00-DR-Z-AI-0001	Issue F1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawlfraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

Legend

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



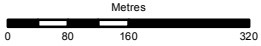
F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd



Llywodraeth Cymru
Welsh Government

Client
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title
M4 Corridor Around Newport
Coridor yr M4 o amgylch Casnewydd



Scale at A3
1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

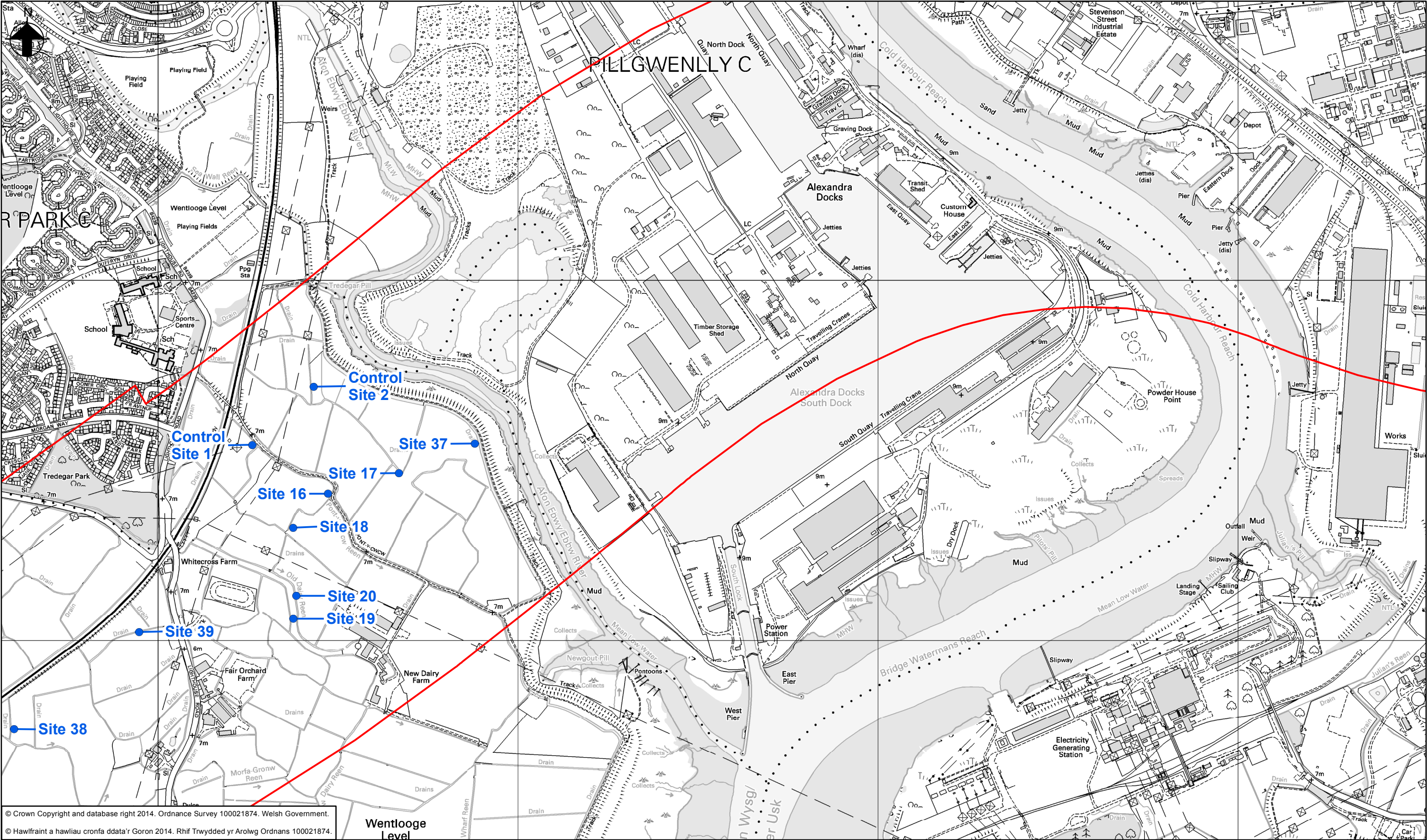
Drawing Title
**Aquatic Macrophytes Sample Locations
Map 2**

Job No
117300-01

Drawing Status
For Issue

Drawing No
M4-OA-01-00-DR-Z-AI-0002

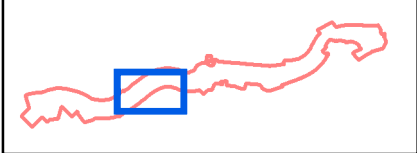
Issue
F1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

Legend

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd

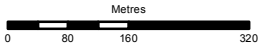


Llywodraeth Cymru
Welsh Government

Client
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title

M4 Corridor Around Newport
Coridor yr M4 o amgylch Casnewydd



Scale at A3
1:10,000

ARUP

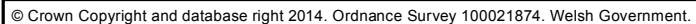
4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Drawing Title

Aquatic Macrophytes Sample Locations
Map 3

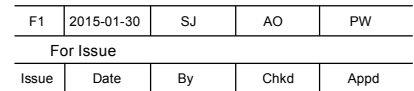
Job No
117300-01
Drawing Status
For Issue

Drawing No
M4-OA-01-00-DR-Z-AI-0003
Issue
F1



© Hawlfraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

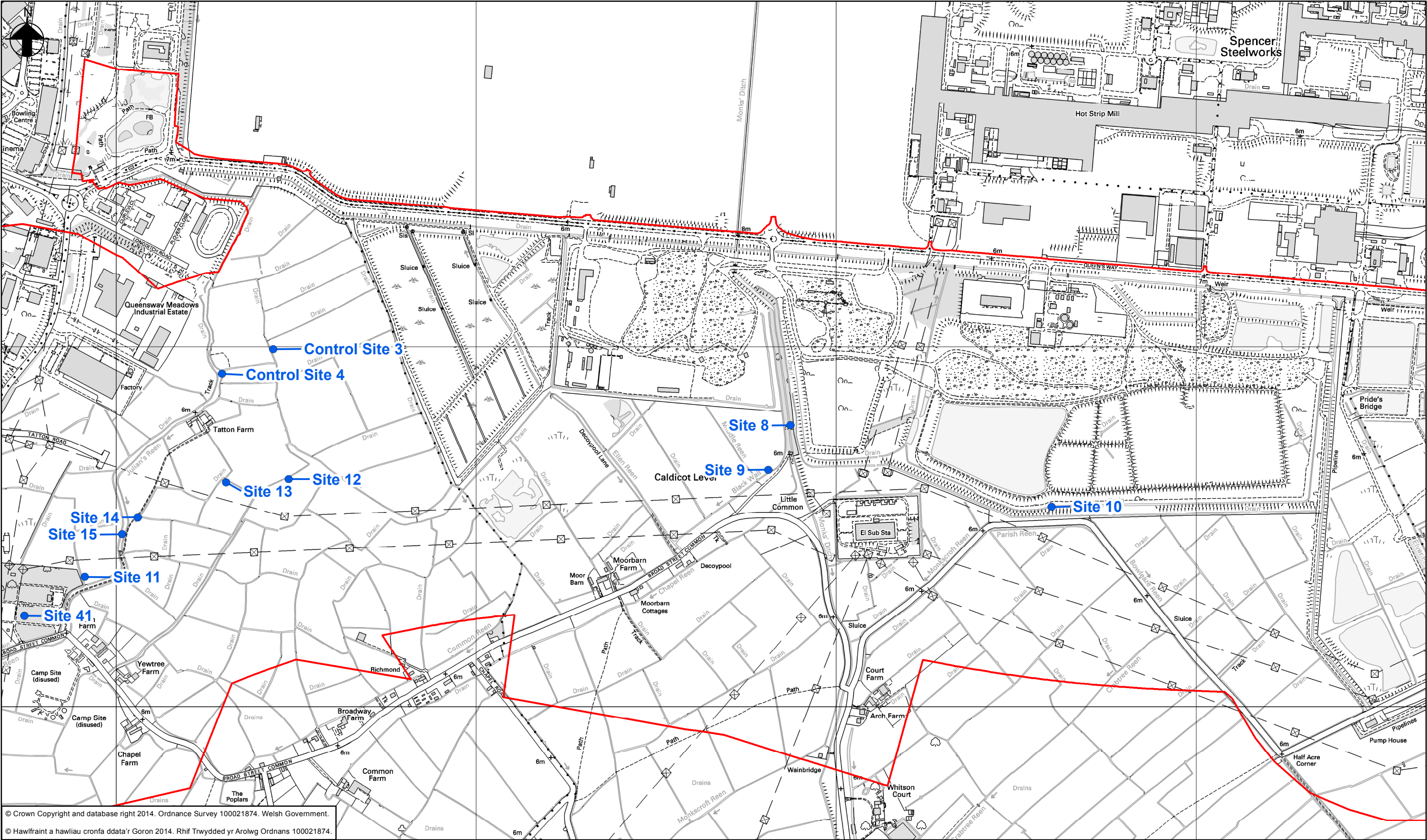
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Trafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

A horizontal scale bar with a black background and white markings. The word 'Metres' is centered above the bar. White tick marks are at 0, 80, 160, and 320. The numbers 0, 80, 160, and 320 are printed below the bar.

Scale at A3
1:10,000

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

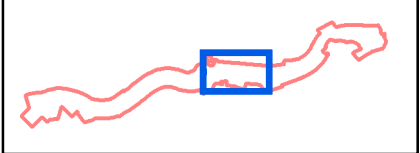
1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

Legend

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



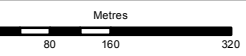
F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd



Llywodraeth Cymru
Welsh Government

Client
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title
M4 Corridor Around Newport
Coridor yr M4 o amgylch Casnewydd



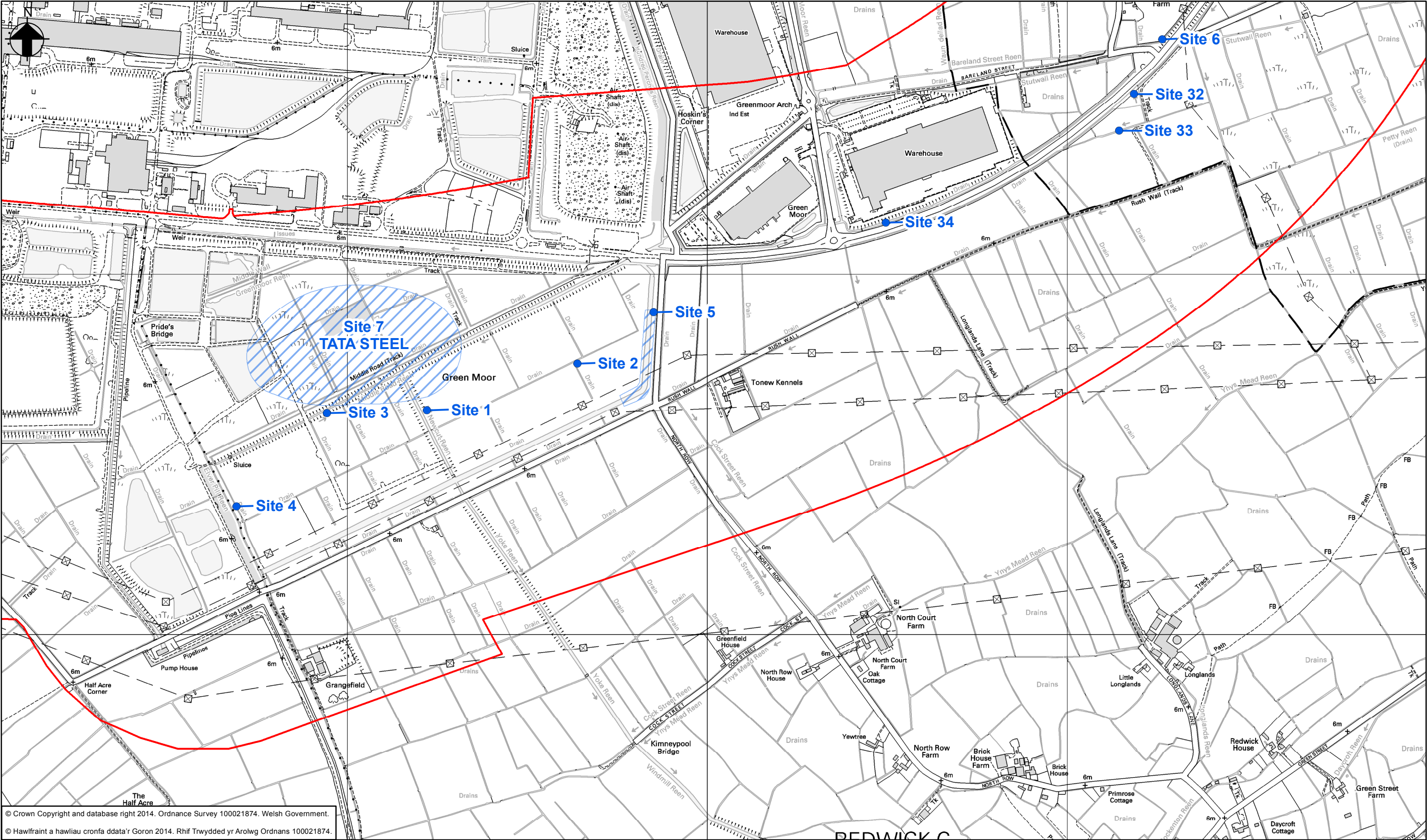
Scale at A3
1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Drawing Title
**Aquatic Macrophytes Sample Locations
Map 5**

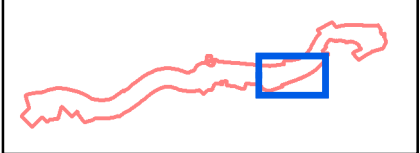
Job No 117300-01	Drawing Status For Issue
Drawing No M4-OA-01-00-DR-Z-AI-0005	Issue F1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

Legend

- Aquatic Macrophyte Sample Location Points
- ▨ Aquatic Macrophyte Sample Areas
- ▭ Study Area



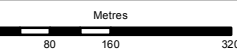
F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd



Llywodraeth Cymru
Welsh Government

Client
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ
Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Trafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title
M4 Corridor Around Newport
Coridor yr M4 o amgylch Casnewydd



Scale at A3
1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

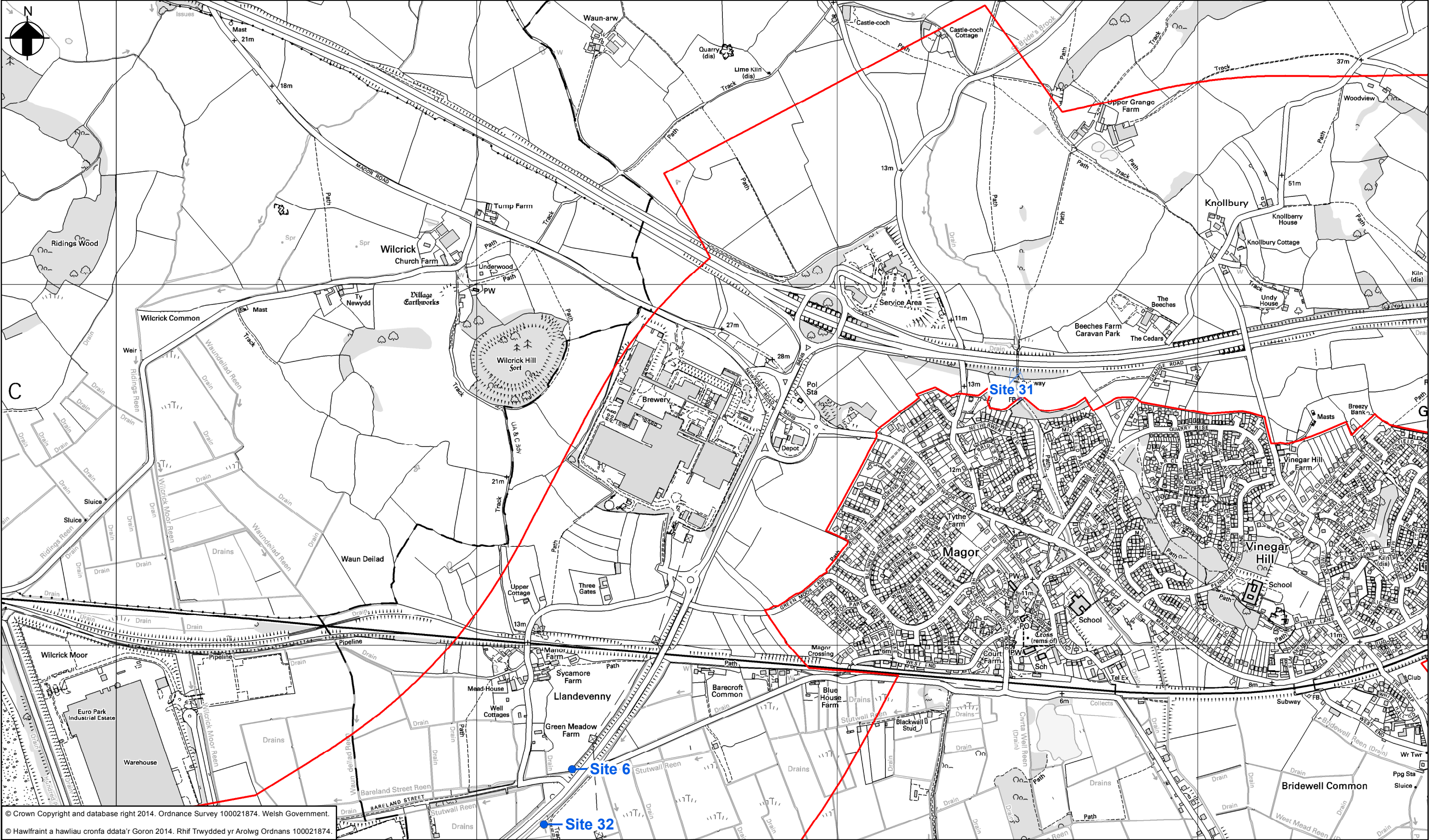
Drawing Title
**Aquatic Macrophytes Sample Locations
Map 6**

Job No
117300-01

Drawing Status
For Issue

Drawing No
M4-OA-01-00-DR-Z-AI-0006

Issue
F1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

- Legend**
- Aquatic Macrophyte Sample Location Points
 - ▨ Aquatic Macrophyte Sample Areas
 - ▭ Study Area

F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd

Llywodraeth Cymru
Welsh Government

Client

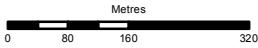
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title

M4 Corridor Around Newport

Coridor yr M4 o amgylch Casnewydd



Scale at A3

1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Drawing Title

**Aquatic Macrophytes Sample Locations
Map 7**

Job No

117300-01

Drawing Status

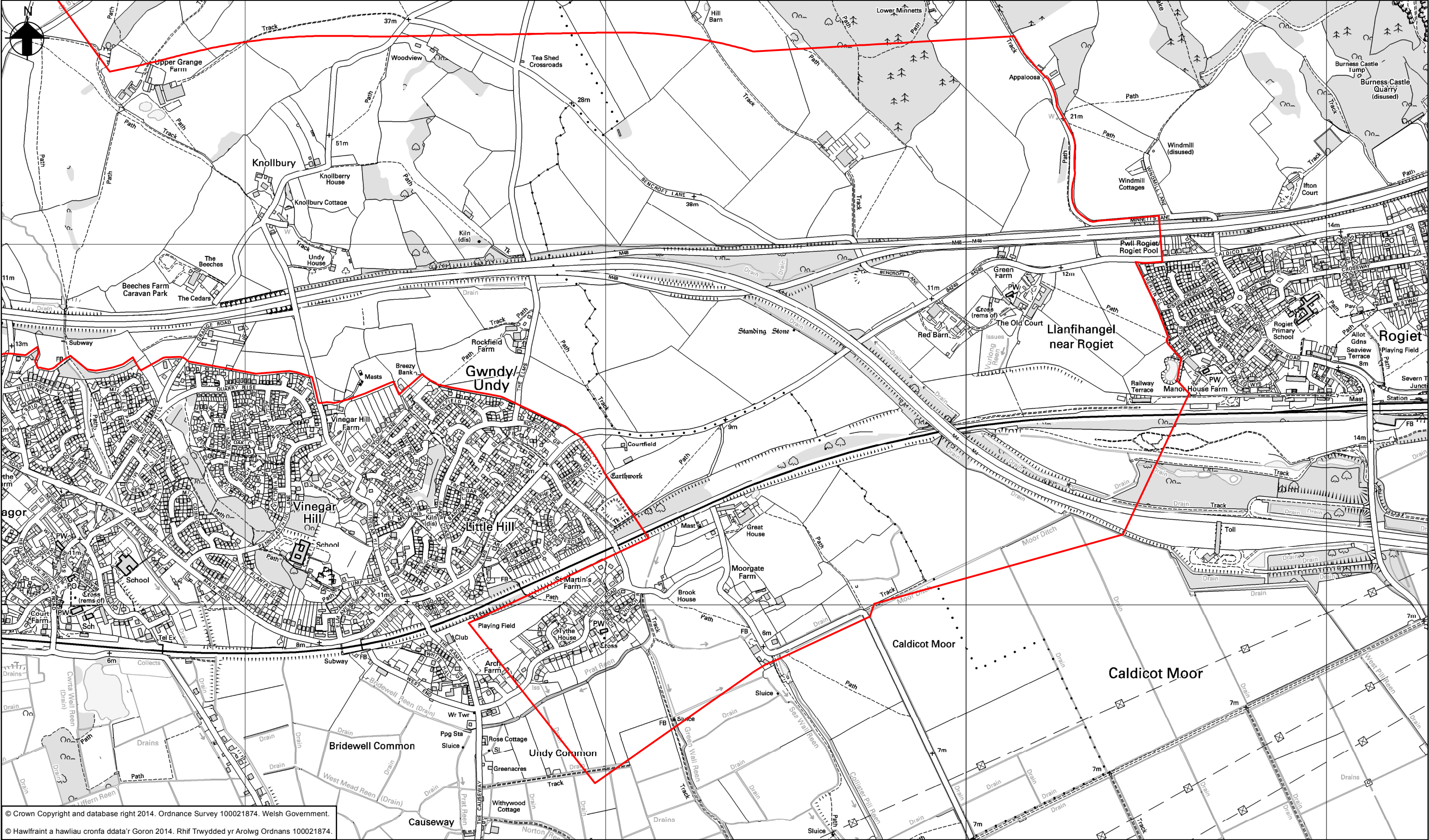
For Issue

Drawing No

M4-OA-01-00-DR-Z-AI-0007

Issue

F1



© Crown Copyright and database right 2014. Ordnance Survey 100021874. Welsh Government.
© Hawffraint a hawliau cronfa ddata'r Goron 2014. Rhif Trwydded yr Arolwg Ordnans 100021874.

- Legend**
- Aquatic Macrophyte Sample Location Points
 - Aquatic Macrophyte Sample Areas
 - Study Area

F1	2015-01-30	SJ	AO	PW
For Issue				
Issue	Date	By	Chkd	Appd

Llywodraeth Cymru
Welsh Government

Client

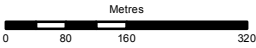
Transport
Department for Economy, Science and
Transport
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

Trafnidiaeth
Adran Economi, Gwyddoniaeth a
Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title

M4 Corridor Around Newport

Coridor yr M4 o amgylch Casnewydd



Scale at A3

1:10,000

ARUP

4 Pierhead Street, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Drawing Title	
Aquatic Macrophytes Sample Locations Map 8	
Job No	Drawing Status
117300-01	For Issue
Drawing No	Issue
M4-OA-01-00-DR-Z-AI-0008	F1