



Photograph 13: Dense scrubland with semi mature woodland and sump 4 in the right hand side of the photo.



Photograph 14: Grassed track with dense woodland both sides and the interception trench in the background.



Photograph 15: Reedbed fed by the discharge of the interception trench. Note the ochreous water.



Photograph 16: Scrubland with semi mature woodland.



Photograph 17: The western margin interception trench with oil sheen and some free product. Note the 200mm diameter pipe entering the trench.



Photograph 18: Historical drainage ditch with abundant ochre noted. The ditch is located within dense woodland and scrub.



Photograph 19: Historical drainage ditch with abundant ochre noted. The ditch is located within dense woodland and scrub.



Photograph 20: Semi mature woodland viewing from the top of the ash bank down the 2 in 1 slope.



Photograph 21: Dense semi mature woodland located adjacent to the railhead haul road.



Photograph 22: Dense scrubland with semi mature woodland.



Photograph 23: The track leading away from the containment area to the railhead separators.



Photograph 24: Semi mature woodland with thick bramble cover.



Photograph 25: Dense scrubland with semi mature woodland.



Photograph 26: Railhead separators viewing north westwards. Water appeared clear with no sheen during walkover.



Photograph 27: Railhead separators viewing north eastwards. Water appeared clear with no sheen during walkover.



Photograph 28: Dirt track leading to the peripheral trench



Photograph 29: Semi mature woodland with thick bramble cover. Ground was noted to be boggy in places.



Photograph 30: Dirt rack with semi mature woodland and thick bramble cover either side.



Photograph 31: Track cutting viewing to the south towards the containment area.

Appendix C – RAP Feature 2 Technical Notes TN931 and TN1106

Technical Note 931

Subject	Coed Darcy – RAP Feature 2, Western Margin Sumps		
Reference	5041216-RAP-TN-931	Revision	FINAL
Author	Matt Timmins	Checker	Howel Morris
Issued to	Monitor	Reviewer	Mike Poland
Date	24 th April 2013	Authoriser	Mike Poland

Introduction

The current interception feature (RAP feature 2) located on the Western Margin of Coed Darcy, captures migrating free product in the area (Drawing 5041216-RAP-DWG-433). This technical note outlines proposed works to improve the current interception feature to increase the capture of free product and prevent migration of ochre into the Crymlyn Bog SSSI.

Pertinent information relating to the works undertaken in this area as well as Section 106 requirements have been reviewed as part of this technical note. The following reports were reviewed:

- Coed Darcy, Remedial Action Plan
- S106 Deed of Planning Obligations. NPTC, Coed Darcy Limited, St Modwen Developments Ltd, St Modwens Properties plc and BP Oil Llandarcy Refinery Limited, 2008
- Atkins Report 5041216-RAP-RPT-770. RAP Features 2,3,4 & 5, Western Margin RAP Works Assessment Report, 2012.

Section Requirements

The Remedial Action Plan (RAP) works, as listed within the S106 for the Western Margin, details the proposed installation of a permanent system to intercept and recover free product to prevent the migration of oil off-site. The proposed remedial solution comprised the installation of an interception trench system listed as items 2 on Drawing 5041216-RAP-DWG-433, in addition to a 200m linear wetland feature included as part of RAP Feature 2.

The scope of currently envisaged remedial actions for RAP Features 2 to 5, as described in the S106 agreement, is as follows:

Product interception and recovery, consisting of the following programme elements:

1. *Design-level investigations to assess specific requirements (RAP 2, 3, 4 & 5)*
2. *Design and installation of permanent system to intercept and recover free-phase product (RAP 2, 3, 4 & 5)*
3. *Diffuse discharge of water arising from interception system to Bog, via purpose-constructed wetland features. (RAP 2)*
4. *System specific monitoring of surface and groundwater (RAP 2, 3, 4 & 5)*

The performance criteria for RAP Features 2, 3, 4 and 5 and the proposed wetland feature within the S106 states the following:

- *Install permanent measures to prevent free product from crossing the site boundary and entering Crymlyn Bog to the satisfaction of the Environment Agency (EA) and Countryside Council for Wales (CCW), (RAP 2, 3 & 5)*

- *Diffuse discharge of water arising from interception system to the Crymlyn Bog, via a purpose-constructed wetland features to reduce dissolved hydrocarbon load and without the requirement for a discharge consent, (RAP 2) and*
- *Prevent ochreous precipitate discharges from site to the Crymlyn Bog arising from the interception feature. (RAP 2)*

The performance criteria and RAP features identified within the S106 were developed on the assumption that the former refinery would remain undeveloped. As such, the primary objective of the proposed RAP works was to deal with potential statutory liabilities associated with the site and any remaining contamination. The requirement for a series of interception features along the western margin of the site was, therefore, largely proposed in order to provide protection from migrating oil into the Crymlyn Bog SSSI to the west.

The former refinery is, however, now proposed for redevelopment. The most recent Masterplan for the former refinery shows the area around RAP Feature 2 to lie within an area designated as 'accessible green space' within the most recent Masterplan.

Proposed works

Previous works are discussed within section 5 of Atkins Report 5041216-RAP-RPT-770 which included the installation of a total of 10no. 600mm diameter sumps along RAP feature 2. Additional works include the installation of a small gravel blanket and a HDPE proto-board which was to stop further migration of free product into the SSSI.

Routine monitoring of these sumps is undertaken monthly and has identified the presence of free product in sumps 2 and 5 on every monitoring visit since installation. The proposed works have been designed to target these areas and are detailed on Drawing 5041216-RAP-DWG-1512.

The works comprise two parts and are discussed separately below.

Works to improve effectiveness of existing proto-board

The proto board currently lies between WMSumps1-3 and Crymlyn Bog SSSI as an additional interception feature (Drawing 5041216-RAP-DWG-1512). It is proposed that the ground immediately east of the board is excavated to approximately 2m bgl and then backfilled with granular fill to allow the movement of groundwater and free product northwards along the trench. A baffle board will be installed to permit the continued movement of water northwards and constrain product migrating past this point. This point of product retention would then be serviced regularly to monitor the inflow rate of product.

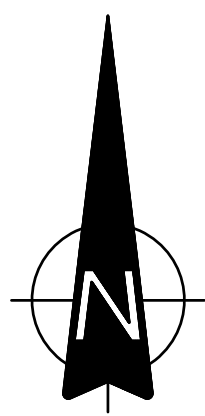
The water passing under the baffle board will flow to a proposed outfall/spillway into an existing pond. To prevent migration of ochre from this pond, reeds will be planted to slow the flow of water from the spillway and to increase the capture of ochre from the trench.

Increase groundwater capture of WMSump 5

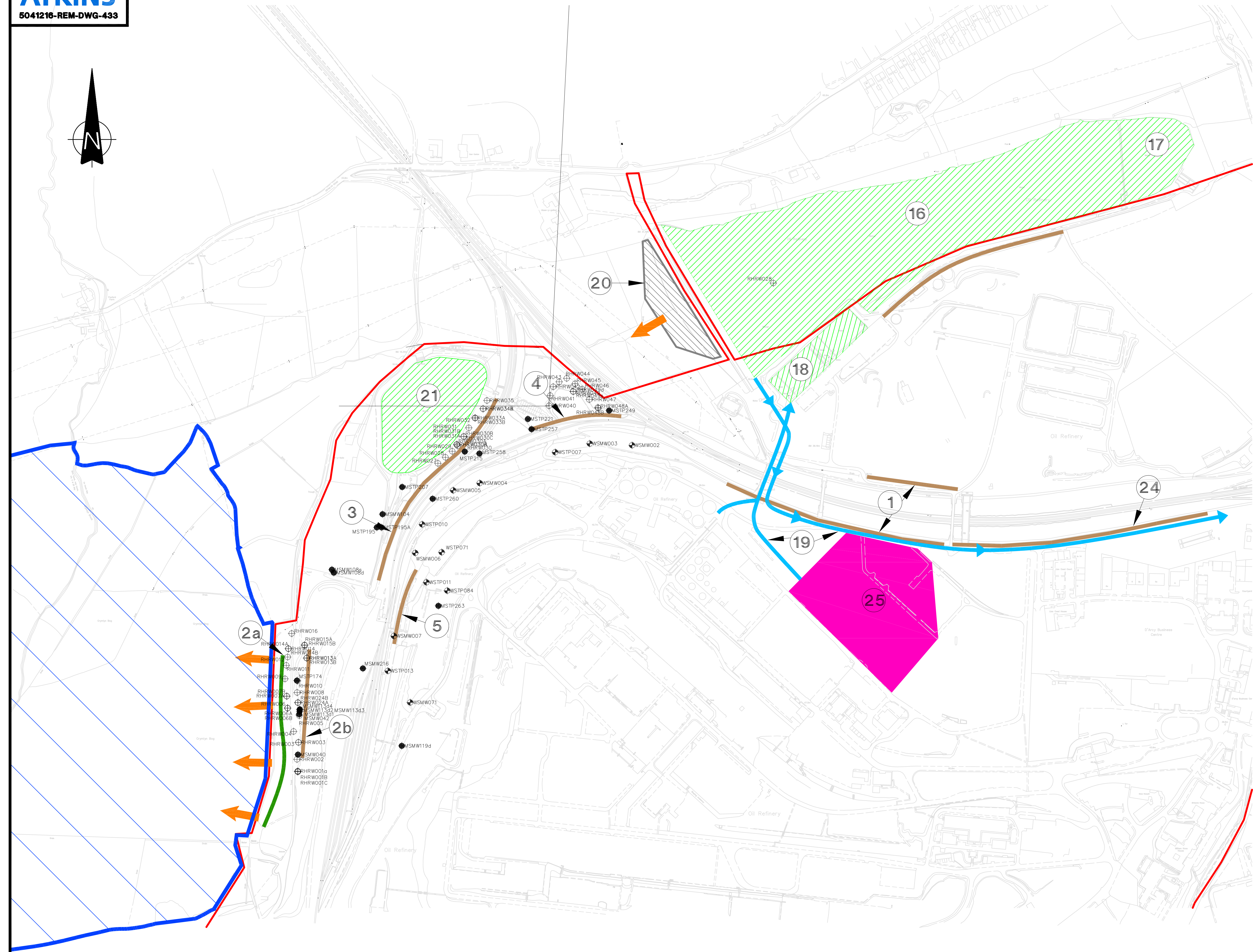
Free product has been noted within WMSump 5 on every monitoring round since installation. To satisfy S106 requirements to show that this is a sufficient interception feature for free product, the proposed works comprise the excavation of a trench 3m long, 1m wide and 3m deep either side of the sump and backfilled with granular fill (Drawing 5041216-RAP-DWG-1512). This granular blanket will increase the capture of the local groundwater and in turn localised free product. The sump will be serviced regularly to encourage increased through-flow of groundwater in to the sump.

Conclusions

It is considered that the result of the proposed works will be an adequate interception feature, which will increase capture of migrating free product and prevent the migration of ochre into Crymlyn Bog SSSI. Once completed, these works will therefore satisfy the requirements of the RAP.



- KEY
- DEVELOPMENT BOUNDARY
 - Diffuse Discharge
 - Free product monitoring/interception
 - Oily sludge removal & treatment
 - Constructed Wetland
 - Earthwork/capping/landscaping
 - Remove/reconfigure drainage
 - Source reduction/containment
 - CRYMLYN BOG SSSI/CRYMLYN BOG SAC
CRYMLYN BOG RAMSAR
(BOUNDARY DETAILS SUPPLIED BY CCW)
 - WSMW002
MSTP249
RHRW013A
 - GI Locations



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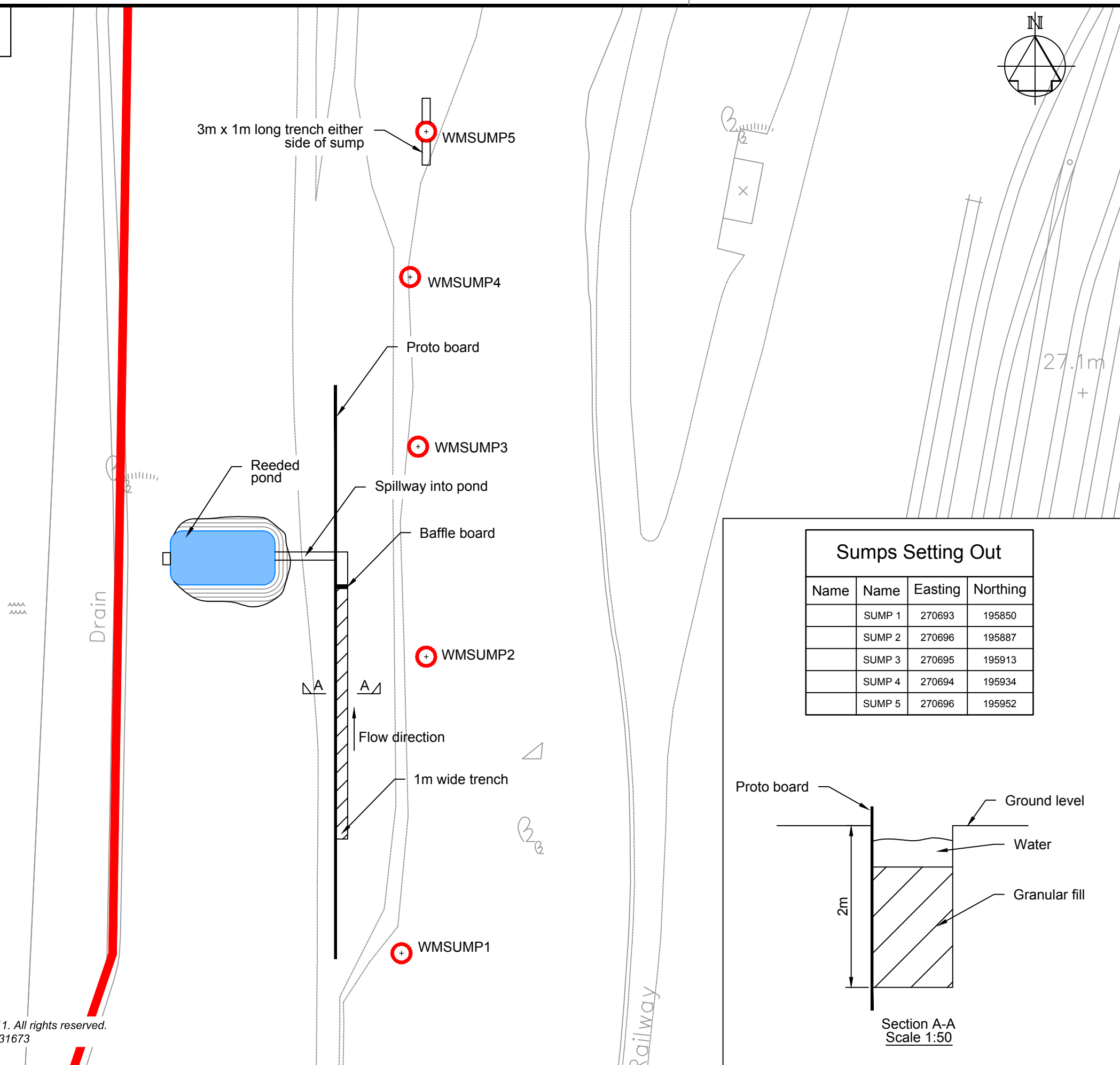
THIS DRAWING IS NOT TO BE SCALED

CLIENT
ST.MODWEN

PROJECT
COED DARCY URBAN VILLAGE

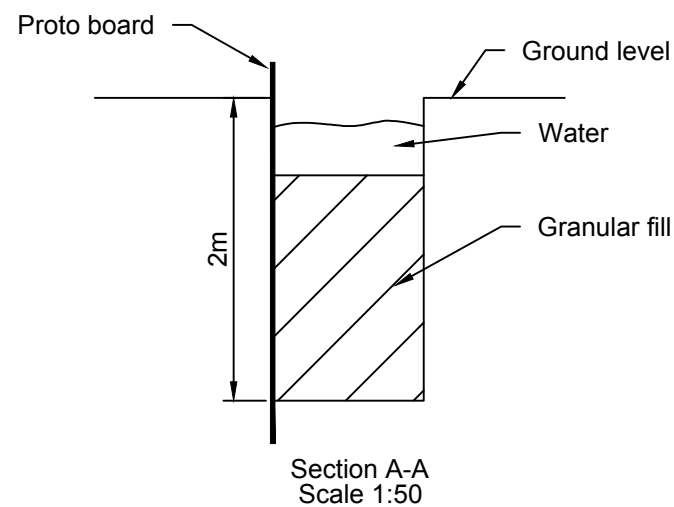
DRAWING TITLE
WESTERN MARGIN RAP FEATURES

Scales 1:2500	DRAWN PY	CHECKED HM	CO-ORD CHECK MP
DATE 05/05/09	DATE 05/05/09	DATE 05/05/09	DATE 05/05/09
DRAWING NO 5041216-REM-DWG-433		SHEET A1	PLOT DATE 19/04/10
REV		A	



Sumps Setting Out

Name	Name	Easting	Northing
	SUMP 1	270693	195850
	SUMP 2	270696	195887
	SUMP 3	270695	195913
	SUMP 4	270694	195934
	SUMP 5	270696	195952



NOTES

- Do not scale this drawing.

KEY

— Development boundary

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PROJECT
Coed Darcy

DRAWING TITLE
RAP Feature 2 (Western Margin Sumps)
Proposed Works for RWCS

SCALES	DRAWN	CHECKED	CO-ORD CHECK
1:500	AJ	MT	
	DATE	DATE	DATE
	16/04/13	16/04/13	

DRAWING NO	SHEET	PLOT DATE	REV
5041216-RAP-DWG-1512	A3	23.04.13	-

Technical Note 1106

Subject	Coed Darcy – RAP Feature 2, Western Margin Sumps		
Reference	5041216-RAP-TN-1106	Revision	FINAL
Author	Adam Putt	Checker	Michelle Lee
Issued to	Rhys Mander (URS) (Monitor)	Reviewer	Michelle Lee
Date	2 nd April 2014	Authoriser	Mike Poland

Introduction

This technical note outlines recent works completed in the Western Margin area to improve the interception of oil/free product, preventing migration of these materials into the Crymlyn Bog SSSI.

The works primarily comprised upgrading the previously constructed interception feature (RAP 2). In addition, a slit trench was excavated adjacent to Groundwater Monitoring Sump 5 to increase the capture of groundwater, and in turn free product.

Background

Prior to the construction of the new interception feature, pertinent information relating to the works undertaken in relation to the Section 106 requirements has been reviewed within Technical Note 5041216-RAP-TN-931. For ease of reference, a copy of this previous Technical Note is attached.

Completed works

Works were undertaken between 11th and 19th November 2013. As discussed within technical Note 5041216-RAP-TN-931, the works comprised two parts:

- Upgrade to previously constructed collection trench
- Installation of slit trenches adjacent to Sump 5

Upgrade to Previously constructed collection trench

The upgraded trench was constructed broadly in line with the design shown on Atkins drawing 5041216-RAP-DWG-1512, with the exception of the use of granular fill. Selected photographs are attached and referenced below for information.

Granular fill was not utilised as part of the works as, during the excavation, the trench sides were deemed robust enough to remain open without the need for backfill. The sides have been battered back at a suitable stable angle and the trench will be cordoned off to prevent access.

The trench measures approximately 37m x 2m and is approximately 2m in depth.

The completed trench has been lined with marine ply to the north, to assist with the collection of free product (photograph 1). A baffle has been placed at the eastern end of the trench to allow the flow of water out of the trench to prohibit flooding, whilst prohibiting the flow of free product (photograph 2). Water flows from the trench down a spillway into a reed pond (photograph 3).

Excess vegetation around the reed pond was cleared as part of the works, and the outlet pipe into the separator tank at the exit from the reed pond was cleaned out such that it is fully functioning to prevent the migration of ochre into Crymlyn Bog SSSI (see photographs 4 and 5).

It was noted that water flowing from the separator adjacent to the reed pond did not appear to be contaminated with free product or ochre.

Slit trench adjacent to Sump 5

A slit trench, measuring approximately 8m by 1.2m and 2m in depth, was excavated, in an east-west direction, to either side of Sump 5. This is in agreement with the design as shown on drawing 5041216-RAP-DWG-1512. The completed excavation is shown in photograph 6.

Following excavation, the sides of the excavation were considered stable enough such that there was no need to utilise granular backfill.

The excavation has been cordoned off to prohibit access (photograph 6).

Some free product was noted to flow into the trench onto of the ground water following the completion of the excavation (photograph 7).

Monitoring and maintenance

Following the completion of this RAP feature, it is proposed that regular monitoring and inspections will take place in order to ensure that they are functioning correctly and that product is removed, as required.

Conclusions

It is considered that following the completion of these works an adequate interception feature has been constructed to prevent the migration free product and ochre into Crymlyn Bog SSSI.

It is considered, therefore, that the requirements of the RAP have been satisfied for RAP feature 2, as per the requirements of the S106.



Photograph 1 – Completed trench showing boards to north (facing west)



Photograph 2 – Baffle board



Photograph 3 – Slipway and reed pond



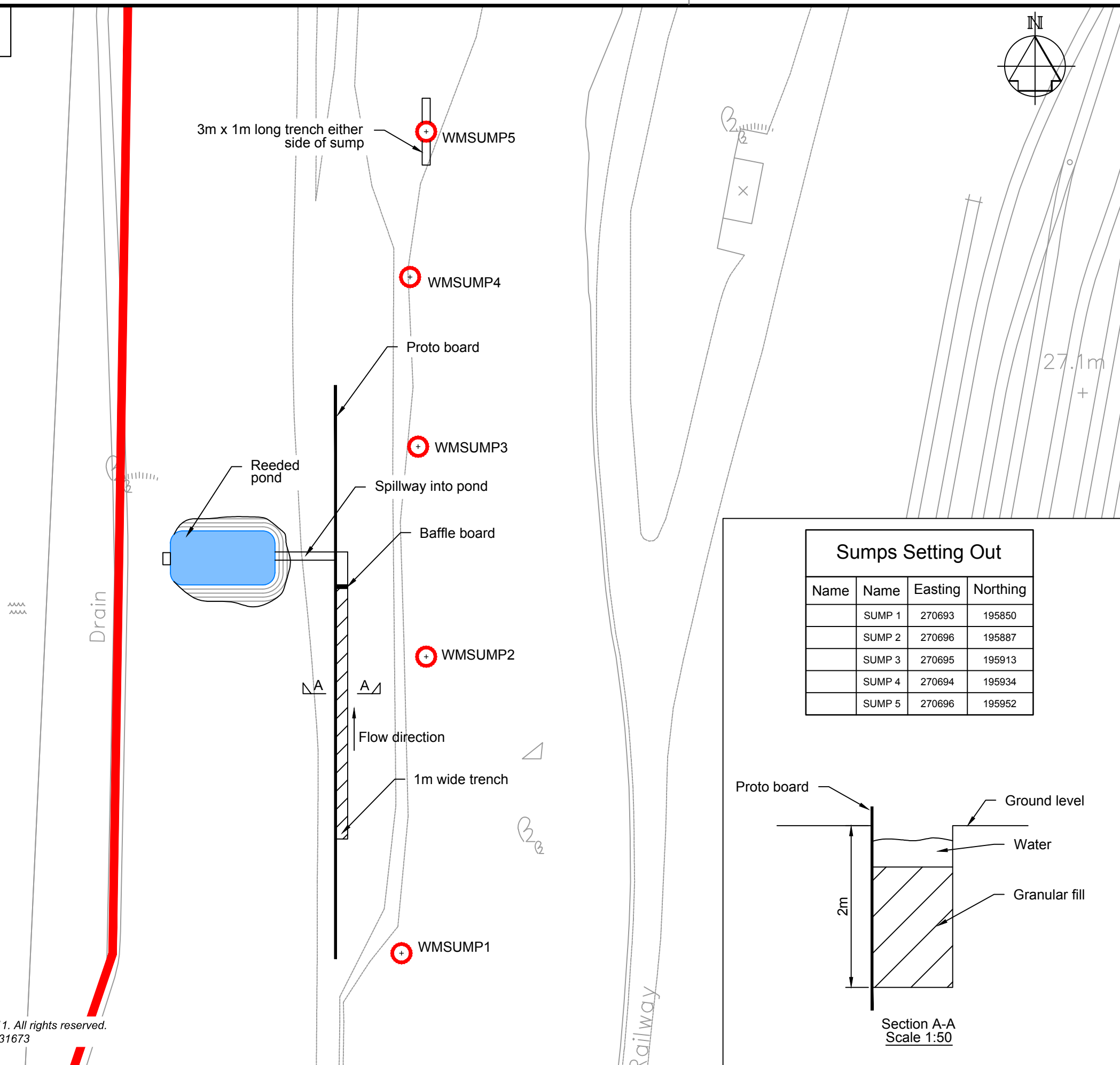
Photographs 4 and 5 – Operational outlet pipe from reed pond into separator



Photograph 6 – Complete excavation to east and west of Sump 5

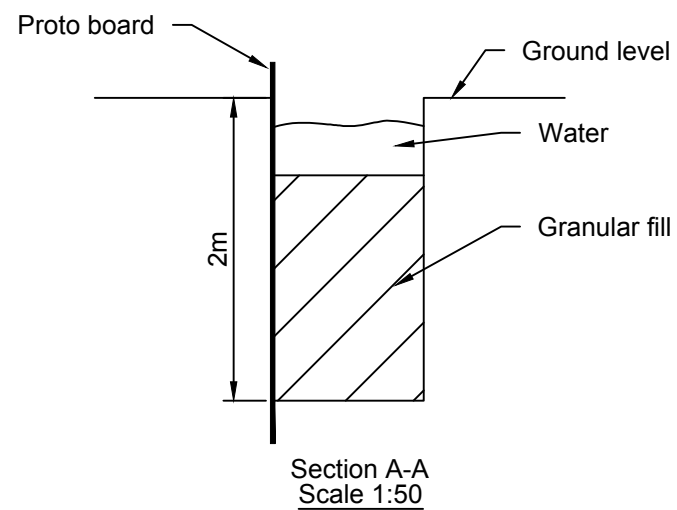


Photograph 7 – Observations of groundwater and free product in slit trench



Sumps Setting Out

Name	Name	Easting	Northing
	SUMP 1	270693	195850
	SUMP 2	270696	195887
	SUMP 3	270695	195913
	SUMP 4	270694	195934
	SUMP 5	270696	195952



NOTES

- Do not scale this drawing.

KEY

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DATE	DATE	DATE	DATE
16/04/13	16/04/13		
		SHEET A3	PLOT DATE 23.04.13

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Appendix D – Chemical Analysis Screening

VOCS BTEX

Contamination analysis results

[illegible]

Appendix E – Pipe Removal Works



1) Pipe 1 – northern most pipe exposed and removed. Viewing north west



2) Pipe 1 - northern most pipe exposed and removed



3) Pipe 2 - Southern most pipe exposed and removed. Viewing east



4) Pipe 2 - Southern most pipe exposed and removed. Viewing south west



5) Pipe 2 – length of pipe located under the haul road removed



6) Pipe 2 sections removed



7) Pipe 3 – Middle pipe exposed and removed



8) Pipe 3 - Middle pipe exposed and removed



9) Pipe 3 – Sections removed.

Appendix F – Atkins Technical Note 5041216-OSW-TN-640

Technical Note

Subject	Coed Darcy: Means of Enclosure to Crymlyn Bog		
Reference	5041216-OSW-TN-000640	Revision	4
Author	Lucy Dean	Checker	Penny Pech
Issued to	Tim Gent	Reviewer	Mike Poland
Date	24 th January 2012	Authoriser	Penny Pech

Introduction

Planning Condition 17 of the Outline Planning Approval (ref P2005/0393) states:

'Prior to the commencement of development, a scheme detailing both temporary and permanent means of enclosure to Crymlyn Bog shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall include details of the proposed materials, fence specification and expected lifespan of each section of fencing and shall give full consideration to measures which will allow or restrict wildlife access to areas. The approved details shall be fully implemented on site in line with a schedule of works that shall form part of the details submitted for approval. Any breach of the approved means of enclosure shall be repaired with the same material within 5 working days. Any change in the material of the approved means of enclosure shall be agreed in writing by the Local Planning Authority prior to its use on site.'

Reason - In the interests of health and safety and to ensure that appropriate materials are used.'

This Technical Note provides details of the fencing scheme for the means of enclosure of the Coed Darcy site to the Crymlyn Bog, as required by this Planning Condition. It supplements information provided in the Coed Darcy Security Management Plan (ref 5041216-ENG-258-CLI-CL-RPT-0059) and the Strategic Code of Construction Practice (ref 5041216-ENG-258-CLI-CL-RPT-0057), which form part of the Coed Darcy Development Strategic Environmental Management Plan (SEMP).

It is understood that this enclosure is required primarily to provide health and safety protection to persons who could potentially enter the Crymlyn Bog from the Coed Darcy site. Whilst this is the stated reason behind Planning Condition 17, additional considerations have been taken account of including a desire to protect the Crymlyn Bog from the potential impacts of human entry, for example, littering, fly-tipping and starting of fires.

The Crymlyn Bog

The Coed Darcy site is bordered on its western boundary by Crymlyn Bog Special Area of Conservation (SAC) and Habitat of International Importance designated under the EU Habitats Directive and the Ramsar convention. Crymlyn Bog also incorporates Crymlyn Bog SSSI and Pant-y-Sais SSSI which also extends to the south of the site. Much of Crymlyn Bog is also designated as a National Nature Reserve (NNR). Crymlyn Bog is of special interest for its fen and swamp communities and associated invertebrate assemblages. It is the most extensive area of lowland fen in South Wales and is situated within a landscape heavily influenced by past and present industrial activities.

The Crymlyn Bog margins also contain localised steep slopes, uneven ground and open water which form inherent hazards and are the primary concerns for this Technical Note.

Scheme for the Means of Enclosure

The boundary between the Crymlyn Bog and the Coed Darcy site is currently fenced off to discourage human entry into the Bog, for reasons as described above. The fence also acts as a security measure to deter public access onto the site, should this be achievable from the Crymlyn Bog. From a security perspective, the fence continues around the periphery of the entire site, as detailed in the Security Management Plan (ref 5041216-ENG-258-CLI-CL-RPT-0059).

For the boundary between the Crymlyn Bog and the Coed Darcy site, the fence height and material varies between the following types:

- (a) Concrete post and wire mesh fencing, varying between approximately 1.2m and 2m high. For some of the stretches of this fencing, there is an overhang and/or barbed wire across the top.
- (b) Galvanised steel palisade fencing, approximately 2.5m high

Drawing 5041216-OSW-DWG-0001035 shows the approximate extent of fencing types for the boundary between the Crymlyn Bog and Coed Darcy site, together with the location of the fence which continues around the periphery of the site.

Localised access through the existing fence-line is afforded at a few locations by a lockable gate. This fencing is in place to allow controlled access for operational health and safety reasons and the effective implementation of the RAP, for example pedestrian access to monitor boreholes.

This existing fence is proposed to be retained in its current form for the foreseeable future. Its suitability will be reviewed as the development progresses and as housing is built closer to the boundaries. As the fence has been in place for some time, it is difficult to refer to an exact lifespan; however from qualitative assessment (rather than quantitative), the predicted lifespan for the two fence types are:

- (a) Concrete post and wire mesh fencing: predicted lifespan of 10 to 20 years.
- (b) Galvanised steel palisade fencing: predicted lifespan of approximately 10 years.

The regular monitoring and repairs (where necessary), as described in Section 6 below, will ensure that the fence remains in good condition until the development of the site dictates that amendment / replacement is required. Section 5 details the approach which will be taken when the fence needs to be changed.

Wildlife Access

The fence will allow small mammals (e.g. shrews, weasels, mice and voles), amphibians and reptiles to pass through / underneath.

Given the inherent hazards of Bog entry, wider openings which could allow access for larger animals, for example, (otters, badgers) and domestic animals and small children are to be avoided in the short to medium term.

Future Amendments and Schedule of works

It is likely that amendments to the fencing will be required in due course as the development is built out. Approval will be sought from the Local Planning Authority for future amendments to the existing fencing, together with approval from the Countryside Council for Wales where the fencing is on land requiring S28 approval (Wildlife and Countryside Act 1981), to access and undertake the works.

The monitoring scheme detailed in Section 6 (below) is in operation.

There is currently no detailed schedule of works as the fence is functioning as required. It is proposed that as part of the Monitoring programme detailed below a review of the fencing on the site is undertaken either for:

- (a) any revised means of enclosure, or
- (b) in advance of the occupation of the first house,

and further details provided with the basis of monitoring confirmed dependant on the health and safety risk which will change as the development proceeds and housing becomes closer to the western boundary. The existing development stand-offs from the boundary are those illustrated on the Coed Darcy Masterplan.

In addition to this, a regular review of the fence will take place every two years, with the first of these reviews taking place two years from the date of discharge of condition 17. These reviews will provide the opportunity to reconsider the scope for controlled access to the Bog, together with the condition of the fence as the development progresses.

Monitoring for breaches

The length of fence which forms the means of enclosure between the Crymlyn Bog and the Coed Darcy Site will be inspected on a bi-monthly basis and breaches identified and repaired as detailed below.

Breaches that are observed in the fence will be assessed in terms of the potential for access to be gained to/from the site from/to the Crymlyn Bog, and prioritised in terms of low, moderate or high, based on the following indicators:

- Size of gap
 - Proximity to external roads / tracks
 - Vegetation
 - Evidence of use
- (a) High Priority breaches, which easily allow human access to be gained to/from the Bog, from/to the site, will be repaired with the same material within 5 working days.
 - (b) Moderate Priority breaches, which do not currently allow human access to/from the Bog, from/to the site but could deteriorate into a high priority breach, will be repaired with the same material within a 2 month period.
 - (c) Low Priority breaches, which do not allow human access, will be monitored during future inspections and repaired if the risk is assessed to increase to moderate or high.

Where dense vegetation is present, making access to the fence from the site difficult, the inspection will be carried out as best as practicably possible. However, it is considered more appropriate to leave vegetation in place rather than clear it to enable the fence inspection, as the vegetation itself provides a deterrent to access to/from the site.