

Technical Note

Project:	P18-669 Llanwern – Phase 4G		
Subject:	Phase 4G Controlled Waters Detailed Quantitative Risk Assessment Addendum		
Prepared by:	Aimee Meredith-Smith – Geo-Environmental Consultant	Date:	14/07/2025
Authorised by:	Chris Wilson – Principal Geo-Environmental Consultant	Status:	S2 - Information
Document Ref:	18669-RLL-25-XX-RP-O-0763	Revision:	P01

1 Introduction

1.1 General

Rodgers Leask Ltd (RLL) has been commissioned by Revantage Real Estate Ltd (Revantage) to develop a phase specific addendum Controlled Waters Detailed Quantitative Risk Assessment (CWDQRA) to assess the potential risk to Controlled Waters for Phase 4G of the Glan Llyn development at Llanwern, Newport (herein referred to as the Site).

In July 2024 the Client, St Modwen Developments was rebranded to be called Revantage Real Estate. Any reference to the previous company name in this report should be referred to accordingly.

1.2 Purpose

This report has been prepared to support the discharge of Planning Condition 27 of the Outline Planning Permission Reference 06/0471 for the proposed development of residential development Phase 4G as part of a wider mixed-use development at Llanwern, Newport.

Planning Condition 27 states the following.

“(27) Prior to the commencement of each phase of development as defined by Condition 03 (or at such other date or stage in development or for such specified activities or works as may be agreed in writing with the Local Planning Authority), the following components of a scheme to deal with the risks associated with contamination relating to that phase or activity shall each be submitted to and approved, in writing, by the Local Planning Authority:

- (1) *A preliminary risk assessment which has identified:
 - (a) all previous uses;
 - (b) potential contaminants associated with those uses;
 - (c) a conceptual model of the site indicating sources, pathways and receptors;
 - (d) potentially unacceptable risks arising from contamination at the site.*
- (2) *A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.*
- (3) *The site investigation results and the detailed risk assessment (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.*
- (4) *A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in (3) are complete and identifying any requirements for longer term monitoring of pollutant linkages, maintenance and arrangements for contingency action. Any changes to these components require the express consent of the Local Planning Authority.*

Reason: To ensure that the proposed development will not cause pollution of the environment or harm to human health."

1.3 Objectives and Scope

The objectives and scope of this report are to assess the soil chemical testing results obtained during previous ground investigations, within the Site, against the soil re-use criteria presented in H F Consulting's Soils Validation Strategy and to discuss the suitability of the soils for retention as part of the proposed remedial works.

1.4 Sources of Information

The following documents have been reviewed in preparation of this technical note, and should be read in conjunction with it:

- RLL, Updated Controlled Waters Detailed Quantitative Risk Assessment, Glan Llyn, ref. 18669-RLE-19-RP-O-0006, dated June 2022
- RLL, Phase 4G Desk Study & Phase 2 Geo-Environmental Report, ref. 18669-RLL-25-XX-RP-O-0753-P01, dated July 2025.
- H F Consulting, Glan Llyn: Soils validation strategy for protection of controlled waters (30937 R2), dated December 2024.

2 Site Information

2.1 Site Setting

The Site is located within the Glan Llyn development at the former Llanwern Steelworks, approximately 5.3km to the east of Newport City Centre at approximate National Grid Reference 336106E, 186676N. The wider Glan Llyn development covers approximately 250 hectares and is proposed to be redeveloped for residential, commercial and open space use.

The Site covers an area of approximately 4.70ha and is located in the approximate centre of the wider Glan Llyn development. The Site historically comprised agricultural land segregated into three fields by hedgerows and drains, until 1967 when the Site formed part of Llanwern Steelworks. The Site housed a sinter plant along with associated infrastructure and various conveyors and pipelines, in addition to roads and an open space area. Drain 3, a historical below ground box culvert, was located on the western side of the Site orientated north-south. The Site was partially demolished by 2004 and fully demolished by 2021.

The Site boundary is shown on Drawing 18669-RLL-22-XX-DR-O-0388, the site illustrative masterplan is presented on Drawing ref. 8111-08-A012, both presented in **Appendix A**.

2.2 Geology

Information pertaining to the underlying ground conditions at the Site has been obtained via the BGS Onshore Geoindex¹. The published geological information shows the Site to be void of Made Ground. However, due to the Site's history, Made Ground is likely to be present associated with the previous development and subsequent demolition.

Superficial deposits are shown to comprise Tidal Flat Deposits.

Tidal Flat Deposits are described by the BGS as *'unconsolidated sediment, mainly mud and/or sand. They may form the top surface of a deltaic deposit. Normally a consolidated soft silty clay, with layers of sand, gravel and peat.'*

The underlying bedrock is shown to be the Mercia Mudstone Group.

The Mercia Mudstone Group is described by the BGS as comprising *'predominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite bearing units in some basinal areas. Thin beds of gypsum/anhydrite are widespread; sandstones are also present'*.

¹ <http://mapapps2.bgs.ac.uk/geoindex/home.html>

There is an inferred fault approximately 900m northeast of the Site which trends roughly north to south and extends northwards away from Site.

2.3 Encountered Ground Conditions

One ground investigation has been undertaken by Atkins in 2018 which covered the Site and two neighbouring phases. As part of this ground investigation 46 trial pits were excavated within the Site area. Detailed information is available in the RLL Phase 4G Desk Study and Ground Investigation Report (**Appendix C**).

The following table provides a summary of the exploratory holes that were situated within the Site boundary.

Summary of Historical Exploratory Holes within the Site Boundary	
Report	Exploratory Holes
Atkins (2018)	46 Trial Pits (4C-G4, 4C-G5, 4C-G6, 4C-H1, 4C-H2, 4C-H4, 4C-H5, 4C-H6, 4C-I1, 4C-I2, 4C-I3, 4C-I4, 4C-I5, 4C-I6, 4C-I7, 4C-J1, 4C-J2, 4C-J3, 4C-J4, 4C-J5, 4C-K2, 4E-C1, 4E-C2, 4E-D1, 4E-D2, 4E-E2, 4E-B4, 4E-C4, 4E-D4, 4E-E4, 4E-E5, 4E-E6, 4E-E7, 4E-G4, 4E-F6, 4E-A8, 4G-B8, 4G-A7, 4G-B9, 4E-A7, 4E-B7, 4E-D7, 4E-C7, 4G-A6, 4G-B5 and 4G-B6)

The ground investigation found the Site to be underlain by Made Ground overlying Tidal Flat Deposits, encountered from ground level to 3.30m depth.

Surfacing of tarmac was encountered in two locations from ground level to 0.10m.

The general Made Ground typically comprised gravelly occasionally ashy SAND, sandy clayey GRAVEL, sandy SILT or sandy gravelly and occasionally loamy CLAY, with occasional to frequent cobbles. Gravel and cobble components typically comprised concrete, brick, iron ore, slag, mudstone, coke, tarmac, siltstone, steel slag and furnace slag.

Tidal Flat Deposits were generally described as soft brown PEAT or soft to firm silty CLAY.

The Mercia Mudstone Group bedrock was not encountered during the intrusive investigation.

2.4 Post-construction ground conditions

The following table provides an anticipated post-construction ground model.

Post-Development Ground Conditions		
Unit	Approximate Thickness	Description
Impermeable Construction Materials/	0.6m	Imported clean topsoil/

Housing Sub-base/Permeable Topsoil		construction materials
Piling Mat*	0.5m	Imported 6F2 (*may be included within 600mm of construction materials)
Made Ground	1.5 – 2.0m	Excavated and re-compacted Made Ground
Tidal Flat Deposits	7.0 – 10.0m	No change from current conditions
Bedrock (Mercia Mudstone Group)	>1,350m	No change from current conditions

In accordance with the assumptions of the 2019 RLL CWDQRA, further mitigation to promote lateral flow is the provision of a drainage blanket to cap the reengineered material (including piling mat) which will increase the fall from the centre of a plot to periphery.

2.5 Historical Groundwater Monitoring and Wider Site Hydrogeology

A summary of pre-reclamation groundwater levels is presented in the Phase 4G Desk Study & Phase 2 Geo-Environmental Report. Groundwater levels recorded during the pre-reclamation ground investigations across the development suggest that the groundwater is present beneath the wider Glan Llyn development as follows:

- Shallow/ perched groundwater within the Made Ground (shallow boreholes); and
- Groundwater within the Tidal Flat Deposits (confined to the basal sand layers) and Mercia Mudstone (deep boreholes).

The shallow perched groundwater described above was recorded during pre-reclamation conditions. The earthworks on the phase include the reengineering of the Made Ground, this shallow perched groundwater shall no longer be present.

Groundwater monitoring within the deep boreholes was considered to be primarily derived from the bedrock geology, and hydraulic continuity between the upper perched shallow groundwater and 'regional' groundwater was considered likely to be limited. Post-development, the excavation and re-compaction of the Made Ground was recognised as likely to reduce its permeability, lowering still further, the hydraulic continuity.

3 Controlled Waters Detailed Quantitative Risk Assessment

3.1 Introduction

In 2019 RLL were commissioned by St Modwen to prepare a Controlled Waters Detailed Quantitative Risk Assessment (CWDQRA) for the wider Glan Llyn development, report reference 18669-RLE-19-RP-O-0006, dated June 2022. This assessment was considered to be an update to and further development of Atkins Limited (Atkins), CWDQRA, Document Reference: 5111373-LLA-OUT-0257, Version: 3, dated February 2017.

The principal objectives of the 2019 RLL CWDQRA, as practicably as possible, was to provide compliant future surface water flow contributions from private drainage system on the wider Glan Llyn development (following the redevelopment for mixed residential and commercial end use) upon entry into the Monks' Ditch. It was also to improve sustainability and further limit the amount of material which requires off-site removal by virtue of its contaminative potential towards local Controlled Waters.

With the aim generating a streamlined and consistent process for the Phase-by-Phase reporting process, in 2024 H Fraser Consulting Ltd. were commissioned to build on the findings of the CWDQRA and produce a Soils Validation Strategy for the Protection of Controlled Waters (30937 R2).

A summary of the reporting relating to controlled waters on the development are presented in the following sections.

The area of the development this assessment covers, which includes the Site, is presented on RLL drawing reference 18669-RLE-19-XX-DR-O-0004 in **Appendix A**.

3.2 RLL CWDQRA Summary

In 2019 RLL prepared a Controlled Waters Detailed Quantitative Risk Assessment (CWDQRA) for the wider Glan Llyn development site. This assessment incorporated a comprehensive dataset of concentrations of contamination recorded in soils across the development, included data taken from the 2018 investigations within the Site. Screening analysis of soil, soil leachate, groundwater and surface water data revealed potential moderate to low levels of inorganic and organic contamination present onsite in line with contaminants associated with former steelworks sites. Made Ground comprising clayey sandy gravels with local slag, burnt shale, tarmac, concrete, brick and mudstone was found to be a potential source of contamination. Calculation of representative re-use criteria for a residential with plant uptake end use was undertaken using a dilution assessment methodology based on the site-wide water balance, incorporating site specific permeability and infiltration parameters. No allowance was made for dilution of

discharged waters within Monks' Ditch itself as part of this calculation as, this being the receptor, it is proposed that the water quality in this Controlled Water be maintained (as far as possible) at EQS values.

Comparison of re-use criteria against available soil chemical testing established that the much of the Made Ground was likely to be suitable for re-use onsite, however, localised source materials existed containing higher concentrations of contamination (particularly elevated concentrations of iron, manganese and vanadium), and ammoniacal and cyanide components, may require remediation, or offsite disposal.

Further modelling of these contaminants was undertaken using Remedial Target Methodology (RTM) to assess the potential extent of attenuation of these specific determinands within the ground where these soils may be placed, with the receiving surface waters being assumed to be existing blueways (reens), which were considered as the Compliance Points. The compliance point for the Residential Development has been assigned to the point of discharge into the receptor Monks' Ditch and will require an enacted permit for discharge to occur.

Initial modelling was carried out by Atkins (Glan Llyn, Llanwern Controlled Waters Detailed Quantitative Risk Assessment dated February 2017), with this approach being adopted within later revisions of this Report in the Rodgers Leask, Controlled Waters Detailed Quantitative Risk Assessment, Glan Llyn (sitewide) Update (2019), using the Equation presented in the EA Table 5.2 – soil-water partitioning of the EA Remedial Targets Methodology Guidance (2006) where a pore-water concentration (C_p) was determined from soil concentration analyses to derive soil reuse criteria at the site as a whole. Subsequently, and purely to gauge the potential distance that re-engineered Made Ground could be placed from the respective Compliance Point(s), further modelling was carried out for specific determinands using the EA RT Excel Worksheets, based on maximum and average soils concentrations determined within samples of re-engineered Made Ground and available site derived data.

Further modelling was carried out for specific determinands (including specific PAHs) using the EA Remedial Target Excel Worksheets, based on maximum and average soils concentrations did indicate that there was little attenuation of the initial porewater PAH concentrations on migration within the re-engineered Made Ground toward the nearest reen Receptors. However, the presence of elevated porewater PAH concentrations was only theoretical and based on calculated values derived using the Equation presented in the EA Table 5.2 – soil-water partitioning of the EA Remedial Targets Methodology Guidance (2006). Actual PAH concentrations determined more recently in groundwater samples recovered (where sufficient groundwater was available for sampling purposes), were generally lower, and potentially significantly lower, than the calculated values which were derived using soils analyses data. Additionally, as previously mentioned, there was little evidence obtained of hydraulically continuous groundwater horizon(s) within the re-engineered Made Ground beneath areas proposed for residential and commercial

development. Therefore, there have been no proven PAH (or other contaminant) migration pathways towards the reens.

As the data used within the CWDQRA has utilised ground investigation data taken from within the Site, it is therefore considered that the findings of this assessment are representative of the Site and therefore adoption of the calculated re-use criteria and recommendations presented within the CWQRA are appropriate.

3.3 HFCL Glan Llyn: Soils Validation Strategy for Protection of Controlled Waters

Following queries from Natural Resources Wales (NRW), H Fraser Consulting Limited (HFCL) were commissioned by RLL to assist with NRW liaison and reporting pursuant to the discharge of PC28. Following discussion with NRW, RLL and the developer, HFCL prepared a revised methodology for the validation of soils in relation to the protection of controlled waters.

The assessment does not rely on groundwater analysis, being dependent rather on soil re-use values. It included distance specific remedial targets that model the attenuation of contaminants in the saturated zone allowing for advection, dispersion, retardation and decay during transport. In addition to the inclusion of distance specific remedial targets, further statistical and spatial analysis was carried out on contaminants of concern.

More detail is provided in the HFC Glan Llyn: Soils Validation Strategy for the Protection of Controlled Waters (30937 R2).

4 Comparison of Phase 4G and CWDQRA Dataset

The dataset utilised in the RLL CWDQRA was taken from soil samples from the wider Glan Llyn development site which included the Site area. A comparison of the residential CWDQRA dataset with the soil samples taken from within the Site has been undertaken.

The purpose of this comparison is to establish if the residential dataset used in the CWDQRA is representative of concentrations of contamination present within Site and therefore whether the derived re-use criteria and recommendations of this assessment are applicable to the Site or whether further assessment is required.

4.1 Phase 4G Sampling

140 soil samples were collected from the Site during the 2018 Atkins ground investigation for contamination testing, taken from the Made Ground and Superficial Deposits. The works comprised trial pitting to collect soil samples for chemical and geotechnical testing. Of the 140 soil samples collected, 103 were taken from the Made Ground and 37 of the natural ground (Tidal Flat Deposits).

The samples were tested for heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbon (TPH), gasoline range organics (GROs), BTEX, pH, soil organic matter (SOM), cyanide, phenols, ammoniacal nitrogen and select samples were also tested for asbestos.

4.2 Comparison of Results

Determinand	Samples from Phase 4G – Residential Area			Samples from CWDQRA - Residential Area			Considered Representative e of CWDQRA data (Yes/No)
	Maximum Soil Sample Value* (mg/kg)	Average Soil Sample Value* (mg/kg)	95 th Percentile Soil Sample Value* (mg/kg)	Maximum Soil Sample Value (mg/kg)	Average Soil Sample Value* (mg/kg)	95 th Percentile Soil Sample Value* (mg/kg)	
Inorganic Metals and Metalloids							
Arsenic	141.00	11.78	18.43	397.00	12.18	21.89	Y
Cadmium	3.48	0.31	1.20	31.30	0.65	2.37	Y
Chromium	810.00	129.11	466.05	3090.00	138.89	590.80	Y
Copper	286.00	23.48	44.48	1790.00	25.19	52.07	Y
Iron	352000	97927	217150	2390000	103039	277000	Y
Lead	144.00	40.67	98.07	4220.00	91.58	231.85	Y
Manganese	49400	9218	32430	408000	9574	33520	Y
Mercury	2.17	0.62	1.40	6.24	0.68	1.40	Y
Nickel	238.00	24.80	43.00	313.00	25.73	44.90	Y
Selenium	24.30	6.10	16.57	51.70	6.09	16.67	Y
Vanadium	1890.00	181.60	512.15	2880.00	206.93	693.10	Y
Zinc	864.00	165.68	423.20	13300.00	291.45	784.75	Y

Determinand	Samples from Phase 4G – Residential Area			Samples from CWDQRA - Residential Area			Considered Representative e of CWDQRA data (Yes/No)
	Maximum Soil Sample Value* (mg/kg)	Average Soil Sample Value* (mg/kg)	95 th Percentile Soil Sample Value* (mg/kg)	Maximum Soil Sample Value (mg/kg)	Average Soil Sample Value* (mg/kg)	95 th Percentile Soil Sample Value* (mg/kg)	
Other Inorganics							
Ammoniacal Nitrogen	141.00	11.78	18.53	1590.00	60.97	263.00	Y
Cyanide	20.90	1.54	1.45	272.00	2.32	4.05	Y
Organics							
Benzene	0.18	0.09	0.10	0.12	0.04	0.04	Y
Toluene	0.14	0.07	0.14	0.07	0.01	0.02	Y
Ethylbenzene	0.10	0.04	0.80	0.02	0.01	0.01	Y
Xylene	0.21	0.10	0.20	0.11	0.01	0.01	Y
Phenol	0.10	0.01	0.01	1.21	0.02	0.03	Y
TPH Criteria Working Group							
Aliphatics >C5-C6	0.20	0.02	0.02	0.92	0.03	0.04	Y
Aliphatics >C6-C8	3.32	0.05	0.06	3.32	0.04	0.09	Y
Aliphatics >C8-C10	46.70	0.39	0.20	74.20	0.20	0.12	Y
Aliphatics >C10-C12	112.00	0.93	0.75	987.00	2.55	0.35	Y
Aliphatics >C12-C16	177.00	6.76	34.35	514.00	5.26	16.47	Y
Aliphatics >C16-C21	194.00	19.07	83.86	3530.00	26.92	83.07	Y
Aliphatics >C21-C35	821.00	79.37	341.45	2980.00	64.53	174.70	Y
Aliphatics >C35-C44	417.00	31.19	99.18	913.00	20.37	68.99	Y
Aromatics >EC5-EC7	0.20	0.02	0.02	5.26	0.03	0.04	Y
Aromatics >EC7-EC8	0.37	0.02	0.02	20.30	0.05	0.04	Y
Aromatics >EC8-EC10	31.10	0.26	0.13	49.50	0.14	0.10	Y
Aromatics >EC10-EC12	112.00	0.91	0.50	658.00	1.71	0.24	Y
Aromatics >EC12-EC16	177.00	4.83	10.55	5280.00	13.62	24.72	Y
Aromatics >EC16-EC21	213.00	18.36	57.83	9800.00	56.85	165.55	Y
Aromatics >EC21-EC35	561.00	92.00	361.35	9010.00	122.76	440.85	Y
Aromatics >EC35-EC44	597.00	49.49	151.4	1580.00	40.69	150.00	Y
Polyaromatic Hydrocarbons							
Acenaphthylene	1.39	0.11	0.45	2100.00	3.08	3.18	Y
Acenaphthene	0.49	0.05	0.16	193.00	0.47	0.41	Y
Anthracene	2.83	0.20	0.67	1860.00	3.61	5.48	Y
Benz(a)anthracene	8.90	0.79	2.59	1150.00	4.64	1.61	Y
Benzo(a)pyrene	8.46	0.83	2.94	714.00	3.73	10.58	Y
Benzo(b)fluoranthene	12.90	1.15	4.43	1110.00	5.28	15.87	Y
Benzo(k)fluoranthene	3.69	0.42	1.59	373.00	2.08	5.96	Y
Benzo(g,h,i)perylene	5.81	0.62	2.00	333.00	2.51	7.27	Y
Chrysene	7.02	0.78	2.74	1090.00	4.22	11.47	Y
Dibenzo(a,h)anthracene	1.49	0.17	0.54	177.00	0.74	1.86	Y
Indeno(1,2,3-cd)pyrene	5.77	0.62	2.06	374.00	2.61	7.46	Y
Fluoranthene	16.60	1.42	5.19	2940.00	11.59	29.56	Y
Fluorene	1.11	0.08	0.26	1890.00	2.81	2.72	Y
Naphthalene	1.21	0.17	0.46	4680.00	10.98	5.66	Y
Phenanthrene	10.30	0.77	2.76	3810.00	9.79	18.03	Y
Pyrene	13.10	1.16	3.93	1.95	0.01	0.03	Y

A review of the datasets has shown that the contaminants largely show similar or lower concentration ranges for the Site and for the wider Glan Llyn development site utilised within the CWDQRA. The results are therefore considered to be representative of the levels of contamination present within the Site and therefore adoption of the calculated

re-use criteria and recommendations presented within the CWDQRA are appropriate for the Site.

Occasional contaminants have higher 95th percentile concentrations within the Site when compared to the DQRA dataset, however given the marginal difference this is not considered to affect the conclusions of the CWDQRA.

In addition, given the values were lower than the relevant reuse criteria, their relatively low mobility and the distance of the Site from existing and future surface waters then it is considered that this shouldn't have a detrimental impact on the conclusions of the CWDQRA.

4.3 Comparison to H Fraser Consulting re-use criteria

The samples collected for the Site, as part of the RLL ground investigation, have subsequently been assessed against the H F Consulting agreed soil re-use values for a residential end use as outlined in the Soils Validation Strategy for the Protection of Controlled Waters. A summary of exceedances is presented in the table below, and the chemical screening results are presented in full in **Appendix B**.

Summary of Exceedances of H Fraser Consulting Reuse Criteria for a Residential End Use				
Contaminant	No. of Exceedances	Location of Exceedances (Depth in m)	Concentration Range (mg/kg)	Screening Value (mg/kg)
Cyanide (Total)	6	4E-D2 (0.25), 4E-D2 (1.00), 4E-E4 (0.50), 4E-E4 (1.00), 4E-E4 (1.50), 4E-E6 (0.80)	3.56 – 20.90	2.02
Iron (Total)	1	4C-G6 (1.00)	352000.00	30500.00
Manganese	6	4C-G4 (1.80), 4C-J4 (1.00), 4C-J4 (1.40), 4E-D2 (1.00), 4E-D4 (1.20), 4E-E7 (0.80)	34400.00 – 49400.00	33300.00
Vanadium	1	4C-G4 (1.80)	1890.00	1606.00

The results show that with the exception of total cyanide, iron (total), manganese and vanadium there are no exceedances of the reuse criteria recorded during the 2018 ground investigation. The location of exceedances are shown on RLL Drawing 18669-RLL-25-XX-DR-O-0762-P01, **Appendix A**.

Recorded exceedances shall be managed, via the earthworks operation, in accordance with the HFC Glan Llyn: Soils Validation Strategy for the Protection of Controlled Waters.

Soil chemical testing certificates are presented within the RLL Phase 4G Desk Study and Ground Investigation Report (18669-RLL-25-XX-RP-O-0753-P01).

5 Conclusion

In 2021 RLL submitted a CWDQRA for the wider Glan Llyn development site. This assessment incorporated a comprehensive dataset of concentrations of contamination recorded in soils across the development. Further assessment has been undertaken comparing soil concentrations recorded within the Site area with those of the wider residential Glan Llyn development site used in the CWDQRA.

This assessment has concluded that the dataset used in the CWDQRA is largely representative of the levels of contamination present within the Site and therefore adoption of the calculated re-use criteria and recommendations presented within the CWDQRA are appropriate for the Site.

Following an assessment of soil chemical testing data from within the Site, exceedances of the reuse criteria for total cyanide, iron (total), manganese and vanadium have been identified that may represent a risk to Controlled Waters.

The soil reuse criteria have been conservatively calculated considering only dilution of contamination by intercepted surface water from the finished development. In reality subsurface degradation and attenuation will occur as these contaminants migrate laterally through the ground, further reducing their concentrations prior to dilution within the on-site private drainage system.

It is recommended that further delineation and assessment of the identified exceedances of total cyanide, iron (total), manganese and vanadium (as shown on RLL Drawing 18669-RLL-25-XX-DR-O-0762-P01) are undertaken as part of the remediation works, with unsuitable material being removed as necessary, in order to ensure that they do not present a risk to controlled waters.

A Remediation Strategy has been prepared for Phase 4G (18669-RLL-25-XX-RP-O-0757-P01) outlining required remedial measures for the Site.

Appendix A: Drawings



GENERAL NOTES

NO DIMENSIONS TO BE SCALED OFF THIS DRAWING.
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS.
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

KEY:

Approximate Site Boundary

Rev	Date	Amendments	By	Chk



Client
St Modwen Developments

Project
P18-669 Llanwern Reclamation

Drawing Title
Phase 4G
Site Location Plan

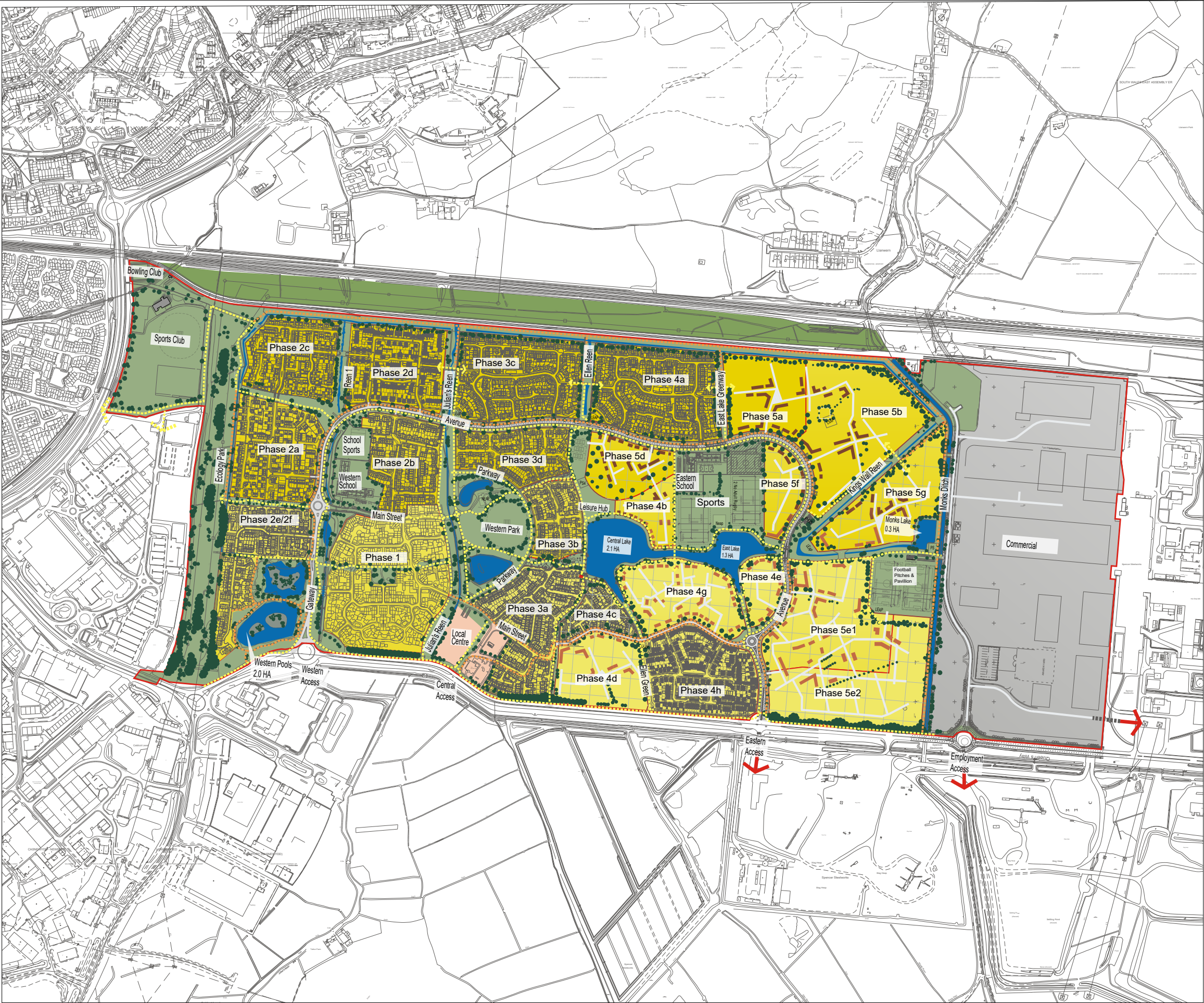
INFORMATION

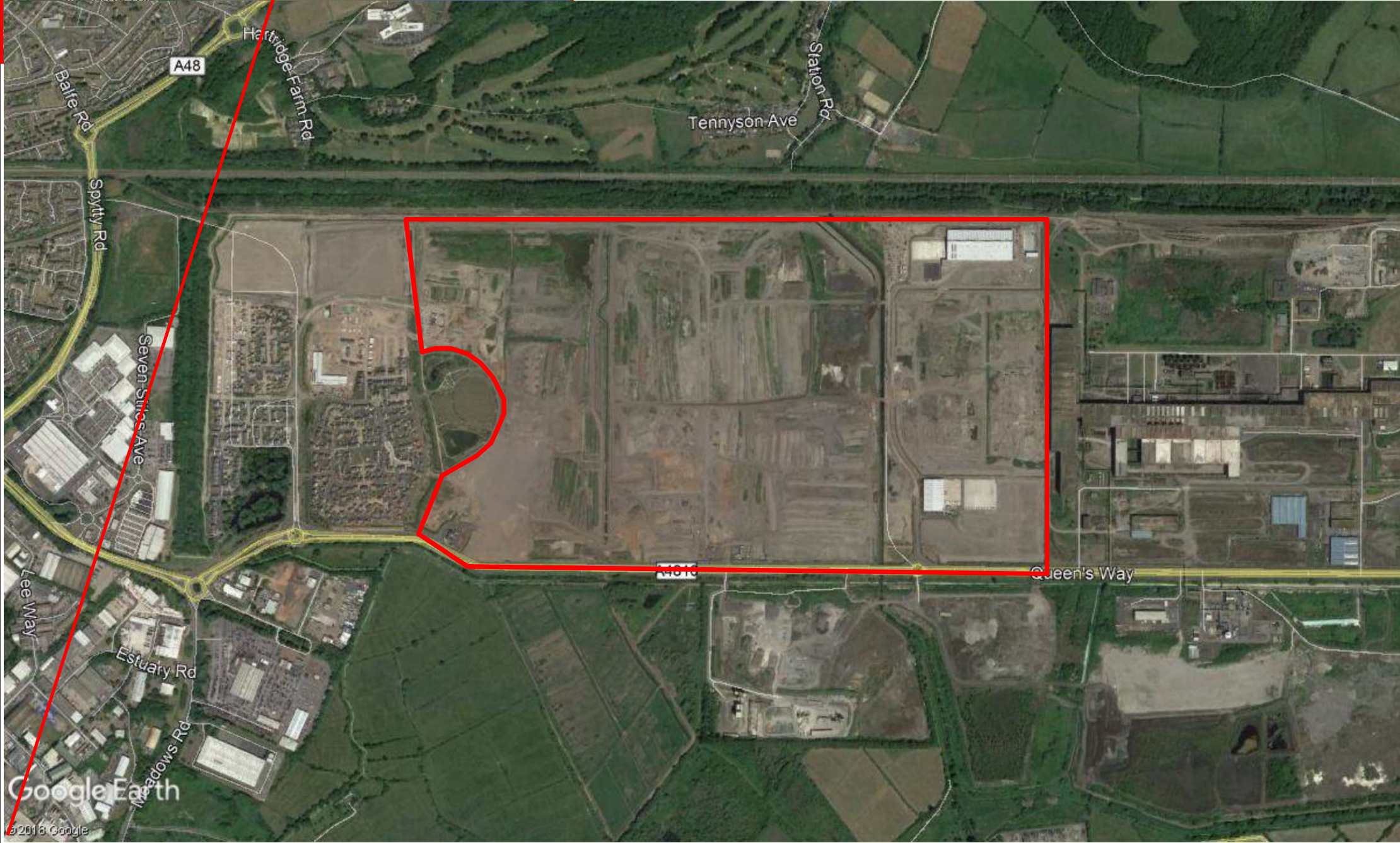
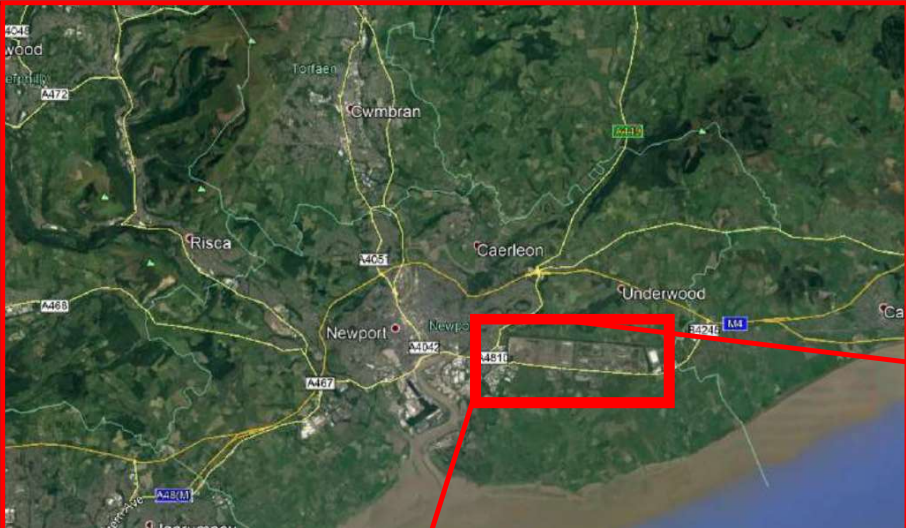
	Drawn	Checked	Date
1:1250 @ A1	SR	CW	20.12.22

Drawing No.
18669-RLL-22-XX-DR-O-0388

Copyright © Rodgers Leask Limited

Glan Llyn -ESAMP Indicative Masterplan





GENERAL NOTES

NO DIMENSIONS TO BE SCALED OFF THIS DRAWING

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT RCHITECTS AND ENGINEER'S DRAWINGS

ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY

Key

 Redline boundary



CLIENT

ST. MODWEN DEVELOPMENTS

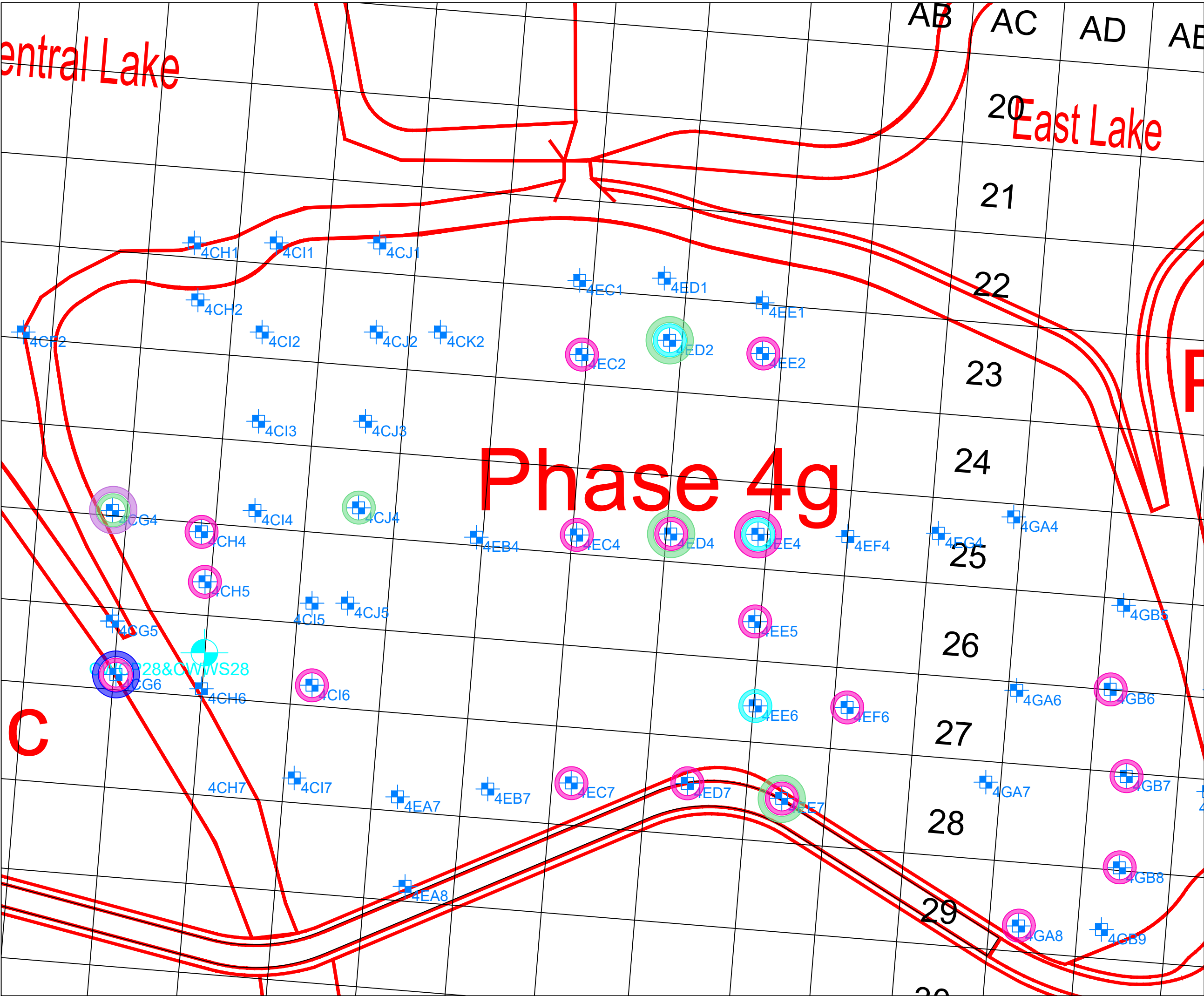
PROJECT

LLANWERN SITE LOCATION PLAN

STATUS

FOR INFORMATION

DRAWN	CHECKED	DATE
ET	CW	19/08/2019
PROJECT NUMBER	DRAWING NUMBER	REV.
P18-669	18669-RLE-19-XX-DR-O-0004	



GENERAL NOTES

NO DIMENSIONS TO BE SCALED OFF THIS DRAWING.
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS.
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

KEY:

- PHASE BOUNDARY
- CWCP31& CWWS31 CWRA BOREHOLE
- TP-AJ21 ATKINS 2018 TRIAL PIT
- CYANIDE (TOTAL)
- AMMONIACAL NITROGEN
- IRON (TOTAL)
- MANGANESE
- VANADIUM

Rev	Date	Amendments	By	Chk



Client
Revantage Real Estate
Project
P18-669 Llanwern Reclamation

Drawing Title
Phase 4G Exploratory Hole
HFC Exceedance Location Plan

INFORMATION

Drawn	Checked	Date
NTS	AMS	CW
04/07/25		
Drawing No.	Rev.	
18669-RLL-25-XX-DR-O-0762	P01	

Copyright © Rodgers Leask Limited

Appendix B: Chemical Screening

P18-669 Llanwern Phase 4G Soil Chemical Screening Results

[illegible]

P18-669 Llanwern Phase 4G Soil Chemical Screening Results

Project: P18-669																																		
Client: Rodgers Leask Environmental					Job No.:		T26	T26	U26	U26	U26	U26	U27	U27	U27	U27	U22	U22	U22	U22	U22	U24	U24	U25	U25	U25	V26	V26	V27	V27	V27	V28	V28	V28
Sample ID:					18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49	18512-49
Order No.: Q21-24056					18512-148	18512-154	18511954	18512026	18512107	18512119	18449507	18449354	18449358	18449368	18512091	18512095	18512005	18512042	18512048	18511995	18511999	18511978	18511985	18511989	18548126	18548131	18548150	18548155	18548160	18548171	18548185	18548198	18548220	
Client Sample Ref.:					4C-H4	4C-H4-V	4C-H5	4C-H5	4C-H5	4C-H5-V	4C-H6	4C-H6	4C-H6	4C-H6-V	4C-I1	4C-I1	4C-I2	4C-I2	4C-I2	4C-I2-V	4C-I3	4C-I3	4C-I4	4C-I4	4C-I4-V	4C-I5	4C-I5	4C-I6	4C-I6	4C-I6-V	4C-I7	4C-I7	4C-I7-V	
Sample Type																																		
Top Depth (m)					1.60-1.60	2.00-2.00	0.50-0.50	1.00-1.00	1.80-1.80	2.50-2.50	0.50-0.50	1.00-1.00	1.50-1.50	3.30-3.30	0.50-0.50	1.10-1.10	0.50-0.50	1.00-1.00	1.50-1.50	1.70-1.70	0.50-0.50	0.80-0.80	0.50-0.50	1.00-1.00	2.50-2.50	0.50-0.50	1.00-1.00	0.50-0.50	1.00-1.00	2.20-2.20	0.50-0.50	1.00-1.00	1.80-1.80	
Bottom Depth (m)																																		
Date Sampled:					11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	02/10/2018	02/10/2018	02/10/2018	02/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	11/10/2018	10/17/2018	10/17/2018	10/17/2018	10/17/2018	10/17/2018	10/17/2018	10/17/2018	
Asbestos Lab:																																		
Determinand	Accred.	SOP	Units	LOD																														
ACM Type	U	2192		N/A																														
Asbestos Identification	U	2192		N/A	-	-	-	Not Detected	Not Detected	-	Not Detected	-	Not Detected	-	Not Detected	-	Not Detected	Not Detected	-	-	Not Detected	-	-	Not Detected	-	Not Detected	Not Detected	Not Detected	-	-	Not Detected	-	-	
Asbestos by Gravimetry	U	2192	%	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total Asbestos	U	2192	%	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Moisture	N	2030	%	0.020	4.31	5.5	4.59	6.15	4.21	7.98	4.9	29.8	8.22	3.81	47.8	7.83	26.4	27.1	10.1	1.26	4.19	4.22	4.38	3.78	1.02	9.3	11	7.2	10	28	6.9	10	24	
Soil Colour	N	2040		N/A	Dark Brown	Grey	Dark Brown	Dark Brown	Dark Brown	Black	Dark Brown	Dark Brown	Dark Brown	Vegetation	Black	Black	Black	Black	Grey	Dark Brown	Black	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	
Other Material	N	2040		N/A	Stones	Vegetation	Stones	Stones	Stones	Vegetation	Crushed Brick	Stones	Crushed Brick	Vegetation	Brick	Vegetation	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	
Soil Texture	N	2040		N/A	Sand	Sandy Silt Loam	Sand	Sand	Sandy Loam	Sandy Silt Loam	Sandy Loam	Sandy Loam	Sandy Loam	Silty Clay Loam	Stone/Silt	Stone/Soil	Sand	Sand	Sand	Silty Clay	Stone/Soil	Stone/Soil	Stone/Soil	Stone/Soil	Sandy Clay Loam	Sandy Loam	Sandy Loam	Loamy Sand	Sandy Loam	Sand	Sandy Loam	Sandy Loam		
pH	M	2010		4.0	8.98	7.4	9.58	9.03	8.89	6.69	10.4	10.8	9.86	7.22	8.81	11.7	9.1	8.64	9.5	8.56	11.6	10.9	10.8	9.21	8.21	10.6	9.19	10.5	12.3	7.85	9.86	10.7	6.91	
Cyanide (Total)	M	2300	mg/kg	0.5	2.02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.42	<1	<1	1.41	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Ammoniacal Nitrogen	M	2425	mg/kg	0.5	154	<12	200	<12	<12	<12	234	<12	<12	<12	141	<12	<12	<12	<12	73.3	<12	<12	<12	<12	<12	<12	<12	<12	<12	194	<12	<12	144	
Iron (Total)	N	2430	mg/kg	100	305000	127000	28200	206000	164000	83300	24100	226000	123000	166000	28300	108000	83100	134000	134000	63500	36700	169000	90900	95900	281000	39300	22800	43000	93400	98000	29600	57000	108000	29900
Arsenic	M	2450	mg/kg	1	2533	10	14.2	16.8	13.8	12.4	16.1	16.1	10.7	11.1	12.3	8.45	<6	21.3	10.1	8.37	12.6	11.6	16.1	9.11	21.6	14.3	4.13	6.28	9.64	7.28	13.6	7.39	5.68	14.9
Cadmium	M	2450	mg/kg	0.1	73	<0.02	0.475	<0.2	<0.2	<0.2	0.219	0.558	<0.2	0.174	<0.02	1.19	<0.2	1.56	0.774	0.397	1.46	1.86	<0.02	3.48	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chromium	M	2450	mg/kg	1	9431	30.5	35	115	101	34.4	39.8	99.3	369	49.5	36.3	36.4	109	214	12.5	171	28.5	91.8	116	52.1	54.4	30.1	19.6	22.3	21.7	462	33.1	41.5	207	31.6
Manganese	M	2450	mg/kg	5	33300	5960	271	11800	9690	3000	422	10500	15500	6130	289	3360	18200	11800	5070	7050	638	7680	9750	8740	8840	1380	6680	4520	4630	29500	575	5450	19100	547
Copper	M	2450	mg/kg	0.5	451	12.5	14.6	38.8	25.9	28.6	17.6	43.4	42.6	17.7	16	21.7	17	27.8	36	22.6	17.96	17.8	17.4	25.7	32.7	11.6	4.45	22.2	12.1	18.8	15.4	11.1	10.4	12.6
Mercury	M	2450	mg/kg	0.1	132	<0.14	<0.14	<1.4	<1.4	<1.4	<0.14	<0.14	<1.4	<0.14	<0.14	<1.4	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<1.4	<1.4	<0.14	<0.14	<1.4	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel	M	2450	mg/kg	0.5	11500	13.3	27.1	47.3	27.5	27.2	29.7	27	238	18	37.2	25.1	11.5	28.6	22.6	15.1	37.3	18.7	19.6	37.9	39.5	2.96	18.6	16	13.1	31.6	8.84	6.72	30.9	
Lead	M	2450	mg/kg	0.5	15700	26	33.7	55.9	66.2	36.1	45	67.6	26.7	41.6	52.2	76.9	25	113	127	25.5	23.5	53.1	34.4	49.9	96.7	24.1	3.53	8.16	29.1	24.4	30.4	45.8	23.2	25.5
Selenium	M	2450	mg/kg	0.2	702	1.25	<1	<10	<10	<10	<1	6.15	<10	3.89	<1	1.02	<10	<10	1.37	4.02	<1	1.76	<10	<10	<10	<1	4.58	2.93	<1	13.7	<1	2.56	4.94	<1
Vanadium	U	2450	mg/kg	5	1606	87.5	56.1	205	176	104	60.6	309	281	92.1	57.3	50.8	134	375	123	124	54.2	143	129	116	1163	62.4	59.3	79	330	53.3	72.4	223	57	
Zinc	M	2450	mg/kg	0.5	138000	103	111	195	251	114	153	301	138	180	143	261	68.3	394	593	117	117	223	137	163	315	118	32.8	49.4	154	60	113	203	138	107
Organic Matter	M	2625	%	0.4		4.31	5.5	4.59	6.15	4.21	7.98	4.9	29.8	8.22	3.81	47.8	7.83	26.4	27.1	10.1	1.26	4.19	4.22	4.38	3.78	1.02	0.94	1.68	1.66	3.26	3.88	6.47	5.14	1.61
Aliphatic TPH >C5-C6	N	2680	mg/kg	1	73000	<0.01	0.0274	<0.01	<0.01	<0.01	0.0116	<0.01	<0.01	<0.01	<0.01	0.0167	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatic TPH >C6-C8	N	2680	mg/kg	1	359000	<0.01	0.0638	<0.01	<0.01	<0.01	0.0231	<0.01	0.0231	<0.01	0.0231	0.0622	0.0594	<0.01	<0.01	<0.01	<0.01	0.0344	0.0343	0.0469	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatic TPH >C8-C10	M	2680	mg/kg	1	2841000	<0.01	0.0851	<0.01	<0.01	<0.01	0.0544	<0.01	0.0147	<0.01	0.0147	0.0544	0.0583	<0.01	<0.01	0.025	0.0231	0.0992	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatic TPH >C10-C12	M	2680	mg/kg	1	22500000	<0.01	0.0623	<0.01	<0.01	<0.01	0.0198	<0.01	0.0274	<0.01	0.0274	0.0866	0.0759	<0.01	<0.01	<0.01	<0.01	0.0594	1.48	0.306	<0.01	<0.01	<0.01	<0.01	<0.01	0.0138	0.0236	<0.01	<0.01	
Aliphatic TPH >C12-C16	M	2680	mg/kg	1	4.50E+08	1.96	<0.1	0.453	1.39	<0.1	<0.1	4.72	37.2	2.05	<0.1	46.4	22.4	6.49	5.67	2.64	<0.1	3.95	23.3	9.62	2.77	<0.1	<0.1	2.54	11.5	<0.1	41	12	<0.1	
Aliphatic TPH >C16-C21	M	2680	mg/kg	1	5.66E+10	19.3	<0.1	4.12	6.57	<0.1	<0.1	18.9	114	11.9	<0.1	194	83.7	18.7	13.9	11.2	<0.1	13.9	15.4	13.8	11.2	<0.1	2.1	4.18	11.4	27	<0.1	116	59	<0.1
Aliphatic TPH >C21-C35	M	2680	mg/kg	1	5.66E+10	339	<0.1	53.4	57.3	11.8	4.21	83.8	92.5	60.5	1.99	154	543	394	215	89.1	<0.1	135	78.8	93.1	83.7	<0.1	30.9	28.9	110	85.1	5.78	821	388	3.64
Aliphatic TPH >C35-C44	N	2680	mg/kg	1	5.66E+10	203	<0.1	23.2	33.6	4.98	<0.1	56.4	5.85	10.9	<0.1	58.5	330	417	205	43.8	<0.1	54.9	44.1	60.6	28.8	<0.1	33.9	8.43	38.2	26.2	<0.1	226	98.3	<0.1
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5		564	<0.1	81.2	98.8	16.8	4.21	164	250	85.3	1.99	452	979	837	439	147	<0.1	208	162	175	126	<0.1	66.9	41.5	162	150	5.78	1210	557	3.64
Aromatic TPH >C5-C7	N	2680	mg/kg	1	8510	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatic TPH >C7-C8	N	2680	mg/kg	1	177000	<0.0																												

P18-669 Llanwern Phase 4G Soil Chemical Screening Results

[illegible]

P18-669 Llanwern Phase 4G Soil Chemical Screening Results

[illegible]

P18-669 Llanwern Phase 4G Soil Chemical Screening Results

Project: P18-669					AB27	W29	W29	W29	AE27	AE27	AE27	AE27	AC28	AD29	AD29	AC28	AD29	AE29	AE29	W28	W28	X28	X28	Z28	Z28	X28	X28	X28	AD25	AD25	AD25	AE25	AE25		
Client: Rodgers Leask Environmental	Job No.:	181031-51	181101-44	181101-44	181101-44	181107-11	181107-11	181107-11	181107-11	181107-11	181107-11	181107-11	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47	181121-47		
Quotation No.: Q21-24056	Sample ID.:	18639188	18646138	18646160	18646164	18681153	18681237	18681247	18786527	18786511	18786517	18786535	18786522	18786500	18786505	18653991	18653998	18654016	18654023	18654118	18653985	18654030	18654036	18654042	18673542	18673546	18673558	18673497	18673509						
Order No.:	Client Sample Ref.:	4E-F6-V	4E-A8	4E-AB-V	4E-AB	4G-B7-V	4G-B8	4G-B8-V	4G-A7	4G-A8	4G-A8	4G-A7-V	4G-B9	4G-B9-V	4E-A7	4E-B7	4E-B7-V	4E-A7	4E-B7	4E-B7-V	4E-D7	4E-D7-V	4E-C7	4E-C7	4E-C7-V	4G-A6	4G-A6-V	4G-B5	4G-B5						
	Sample Type:	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	
	Top Depth (m):	1.55-1.55	0.50-0.50	1.00-1.00	1.70-1.70	1.20-1.20	0.40-0.40	0.80-0.80	1.60-1.60	0.50-0.50	0.40-0.40	0.70-0.70	1.80-1.80	2.10-2.10	0.50-0.50	1.60-1.60	0.40-0.40	0.90-0.90	0.50-0.50	1.60-1.60	0.50-0.50	1.90-1.90	0.50-0.50	1.00-1.00	1.80-1.80	0.50-0.50	0.70-0.70	2.80-2.80	0.50-0.50	1.00-1.00					
	Bottom Depth (m):																																		
	Date Sampled:	30/10/2018	10/31/2018	10/31/2018	10/31/2018	11/6/2018	11/6/2018	11/6/2018	11/6/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	20/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018	01/11/2018		
	Asbestos Lab:																																		
Determinand	Accred.	SOP	Units	LOD																															
ACM Type	U	2192		N/A				Chrysotile			Chrysotile																								
Asbestos Identification	U	2192		N/A		-	-	Detected	-	-	Detected	-	Not Detected	Not Detected	-	-	-	Not Detected	-	-	Not Detected	Not Detected	-	Not Detected	-	Not Detected	-	-	-	Not Detected	-	-	Not Detected		
Asbestos by Gravimetry	U	2192	%	0.001		-	-	<0.001	-	-	0.0028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Asbestos	U	2192	%	0.001		-	-	<0.001	-	-	0.0028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Moisture	N	2030	%	0.020		31	7.5	7.7	23	30	6	6.7	34	9.2	8.2	4.6	22	28	7.6	22	9.4	14	7.2	24	15	31	7.7	13	38	14	14	72	7.7	7.1	
Soil Colour	N	2040		N/A		Dark Brown	Dark Brown	Dark Brown	Dark Brown	Black	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Light Brown	Dark Brown	Grey	Grey	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	
Other Material	N	2040		N/A		Vegetation	Stones	Stones	Vegetation	Vegetation	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones		
Soil Texture	N	2040		N/A		Sandy Clay	Sand	Loamy Sand	Silty Clay	Clay	Loamy Sand	Loamy Sand	Clay	Sandy Loam	Loamy Sand	Sand	Clay	Clay	Sandy Loam	Silty Clay Loam	Sandy Loam	Stone/Soil	Stone/Soil	Silty Clay Loam	Loamy Sand	Sandy Loam	Sand	Sand	Clay	Sand	Sandy Clay	Loamy Sand	Sand		
pH	M	2010		4.0		6.87	10.8	12.5	8.14	7.43	10.6	12.2	7.54	10.7	10.1	11.4	8.76	7.48	11.7	8.48	10.3	11.6	12.7	7.89	10.3	7.87	10.4	11.4	8.25	11.9	11.6	6.85	8.81	12.3	
Cyanide (Total)	M	2300	mg/kg	0.5	2.02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Ammoniacal Nitrogen	M	2425	mg/kg	0.5	154	216	<12	<12	76.4	235	22.5	<12	264	<12	<12	<12	59.7	202	<12	113	<12	<12	21	130	28.2	262	13.6	<12	269	22.7	<12	97.3	<12	<12	
Iron (Total)	N	2430	mg/kg	100	305000	39800	133000	66500	38900	27900	205000	177000	28000	43400	91800	26700	38300	22300	196000	23600	183000	134000	220000	38200	77100	42200	174000	152000	68100	165000	159000	13200	25000	207000	
Arsenic	M	2450	mg/kg	1	2533	11.9	<6	5.52	18.9	9.92	12	<6	10.8	6.83	7.85	2.33	12.4	11	7.56	8.08	13.6	<6	10.5	19.1	12.2	15	15.3	9.98	15.5	13.8	<6	10.2	8.81	<6	
Cadmium	M	2450	mg/kg	0.1	73	<0.02	<0.2	<0.02	0.3	<0.02	<0.2	<0.2	<0.02	0.886	0.804	0.287	0.264	1.84	<0.02	<0.2	<0.2	0.316	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.19	<0.2	0.222	0.245	<0.2	
Chromium	M	2450	mg/kg	1	9431	41.4	<9	115	27	33.3	65.8	397	31	33	245	49.4	74.3	33.1	403	25.9	188	359	775	40.8	<9	39.8	63.2	168	115	240	533	3.2	21.7	763	
Manganese	M	2450	mg/kg	5	33300	639	2070	13100	1750	277	7300	413	274	4350	15700	2950	2710	328	3380	650	11500	26600	33000	523	1940	1300	11400	7850	6170	23700	30100	292	1110	4310	
Copper	M	2450	mg/kg	0.5	451	13.7	<14	11.1	12.1	19.6	84.5	26.4	12.9	10.7	19.2	4.82	12	14.7	62.8	7.73	25.1	20	34.4	11.4	<14	<14	25.3	24.9	23.3	32.3	15.9	15.6	26.5	28.3	
Mercury	M	2450	mg/kg	0.1	132	<0.14	<1.4	<0.14	<0.14	<0.14	<1.4	<1.4	<0.14	<0.14	<1.4	<0.14	<0.14	<1.4	<1.4	<0.14	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	
Nickel	M	2450	mg/kg	0.5	11500	30.3	37.5	7.78	42.1	28	54.3	15.4	24.3	13.1	18.9	2.88	36	30.9	24.3	31.1	21.6	14.6	28.4	39.3	14.3	29.4	31.6	24.2	22.1	22.3	12.7	9.29	25.5	12	
Lead	M	2450	mg/kg	0.5	15700	32	41.9	48.9	28.8	32	107	26.2	34.3	32.4	28.5	24.6	29.7	30.4	39.8	20	86.7	36	31.2	29.4	94.4	39.8	116	91.6	45.3	30.1	14.3	4.61	24.2	19.4	
Selenium	M	2450	mg/kg	0.2	702	<1	<10	6.07	<1	<1	20.9	<1	1.3	<10	<1	1.04	<1	15.6	<1	<1	<10	10.9	22	<1	<10	<10	<10	<10	2.88	6.38	15.5	1.55	<1	24.3	
Vanadium	U	2450	mg/kg	5	1606	65.9	163	117	54.2	47.4	106	416	48.6	58.8	225	38.8	89.4	54.1	453	43.3	276	419	591	66.9	43.7	63.9	226	140	108	430	985	10.5	40.4	702	
Zinc	M	2450	mg/kg	0.5	138000	114	145	201	116	142	446	89.5	101	114	112	109	97.8	108	69.1	83.5	346	85.9	97.6	108	270	106	422	323	149	99.3	50.6	47.1	45.1	51.8	
Organic Matter	M	2625	%	0.4		3.78	51.4	4.91	0.905	3.64	14.3	<0.35	6.26	24.8	6.1	10.8	1.56	4.14	9.64	0.85	6.81	8.45	1.56	1.61	2.78	5.07	6.84	27.1	9.19	5.69	3.22	59.8	9.03	1.08	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1	73000	<0.01	<0.02	0.0336	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1	359000	<0.01	<0.02	0.137	<0.02	<0.02	<0.02	0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.172	3.32	0.0377	<0.02	<0.02	0.0526	0.0314	<0.02	0.219	<0.02	<0.02	<0.02	<0.02	<0.02	
Aliphatic TPH >C8-C10	M	2680	mg/kg	1	2841000	<0.01	<0.02	0.444	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	2.5	46.7	0.0237	<0.02	<0.02	0.092	0.0238	<0.02	0.481	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Aliphatic TPH >C10-C12	M	2680	mg/kg	1	22500000	<0.01	<0.02	2.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	7.19	112	0.109	<0.02	<0.02	0.139	<0.02	0.881	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Aliphatic TPH >C12-C16	M	2680	mg/kg	1	4.50E+08	<0.1	5.47	34.2	<0.1	<0.1	2.6	2.13	<0.1	0.793	2.71	0.593	<0.1	0.156	1.85	<0.1	77.4	177	1.71	0.174	<0.1	0.53	4.01	2.92	1.63	2.03	1.5	0.546	1.67	1.81	
Aliphatic TPH >C16-C21	M	2680	mg/kg	1	5.86E+10	<0.1	23.9	79.4	<0.1	<0.1	21.8	9.8	<0.1	4.98	26.9	5.21	<0.1	9.2	<0.1	39.8	20	86.7	36	31.2	29.4	94.4	39.8	116	91.6	45.3	30.1	14.3	4.61	24.2	19.4
Aliphatic TPH >C21-C35	M	2680	mg/kg	1	5.66E+10	1.71	131	404	<0.1	7.61	226	60.1	6.58	60.5	167	24.7	<0.1	0.692	60.7	<0.1	425	561	90.5	0.296	17.7	16.1	97.9	42	55.3	53.5	21.9	42.8	11.9	51.5	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1	5.66E+10	<0.1	27.3	91.4	&																										

Project: P18-669					AE25	AE26	AE26	AE26
Client: Rodgers Leask Environmental	Job No.:				181106-25	181106-25	181106-25	181106-25
Quotation No.: Q21-24056	Sample ID.:				18673513	18673527	18673532	18673538
Order No.: .	Client Sample Ref.:				4G-B5-V	4G-B6	4G-B6	4G-B6-V
	Sample Type:				SOLID	SOLID	SOLID	SOLID
	Top Depth (m):				2.10-2.10	0.50-0.50	0.90-0.90	1.80-1.80
	Bottom Depth (m):							
	Date Sampled:				05/11/2018	05/11/2018	05/11/2018	05/11/2018
	Asbestos Lab:							
Determinand	Accred.	SOP	Units	LOD				
ACM Type	U	2192		N/A				
Asbestos Identification	U	2192		N/A		-	-	Not Detected
Asbestos by Gravimetry	U	2192	%	0.001				
Total Asbestos	U	2192	%	0.001				
Moisture	N	2030	%	0.020		21	9.7	9.4
Soil Colour	N	2040		N/A		Dark Brown	Dark Brown	Dark Brown
Other Material	N	2040		N/A		None	Vegetation	Vegetation
Soil Texture	N	2040		N/A		Silty Clay	Sandy Loam	Sandy Loam
pH	M	2010		4.0		8.16	10.5	11.9
Cyanide (Total)	M	2300	mg/kg	0.5	2.02	<1	<1	<1
Ammoniacal Nitrogen	M	2425	mg/kg	0.5	154	<12	15.6	<12
Iron (Total)	N	2430	mg/kg	100	305000	31500	58700	115000
Arsenic	M	2450	mg/kg	1	2533	141	10.7	<6
Cadmium	M	2450	mg/kg	0.1	73	0.408	0.932	<0.2
Chromium	M	2450	mg/kg	1	9431	26.9	79.1	421
Manganese	M	2450	mg/kg	5	33300	1050	6010	2070
Copper	M	2450	mg/kg	0.5	451	66	23	16.1
Mercury	M	2450	mg/kg	0.1	132	<0.14	<0.14	<1.4
Nickel	M	2450	mg/kg	0.5	11500	33	17.5	12.2
Lead	M	2450	mg/kg	0.5	15700	29.4	54.8	18.3
Selenium	M	2450	mg/kg	0.2	702	<1	2.33	12
Vanadium	U	2450	mg/kg	5	1606	48.4	113	286
Zinc	M	2450	mg/kg	0.5	138000	130	332	75.2
Organic Matter	M	2625	%	0.4		0.926	6.47	4.26
Aliphatic TPH >C5-C6	N	2680	mg/kg	1	73000	<0.02	<0.02	<0.02
Aliphatic TPH >C6-C8	N	2680	mg/kg	1	359000	<0.02	<0.02	<0.02
Aliphatic TPH >C8-C10	M	2680	mg/kg	1	2841000	<0.02	<0.02	<0.02
Aliphatic TPH >C10-C12	M	2680	mg/kg	1	22500000	<0.02	<0.02	<0.02
Aliphatic TPH >C12-C16	M	2680	mg/kg	1	4.50E+08	<0.1	15	2.03
Aliphatic TPH >C16-C21	M	2680	mg/kg	1	5.66E+10	<0.1	13.4	9.5
Aliphatic TPH >C21-C35	M	2680	mg/kg	1	5.66E+10	<0.1	121	74.1
Aliphatic TPH >C35-C44	N	2680	mg/kg	1	5.66E+10	<0.1	91.6	47.5
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5		<0.1	241	133
Aromatic TPH >C5-C7	N	2680	mg/kg	1	8510	<0.02	<0.02	<0.02
Aromatic TPH >C7-C8	N	2680	mg/kg	1	177000	<0.02	<0.02	<0.02
Aromatic TPH >C8-C10	M	2680	mg/kg	1	144000	<0.02	<0.02	<0.02
Aromatic TPH >C10-C12	M	2680	mg/kg	1	227000	<0.02	<0.02	<0.02
Aromatic TPH >C12-C16	M	2680	mg/kg	1	451000	<0.1	5.94	2.16
Aromatic TPH >C16-C21	U	2680	mg/kg	1	1424000	0.34	13.9	10.7
Aromatic TPH >C21-C35	M	2680	mg/kg	1	11300000	3.05	229	108
Aromatic TPH >C35-C44	N	2680	mg/kg	1	11300000	0.95	228	74.8
Total Aromatic Hydrocarbons	N	2680	mg/kg	5		4.34	476	196
Total Petroleum Hydrocarbons	N	2680	mg/kg	10		4.34	717	329
Benzene	M	2760	µg/kg	1	3800	<90	<90	<90
Toluene	M	2760	µg/kg	1	128000	<70	<70	<70
Ethylbenzene	M	2760	µg/kg	1	80000	<40	<40	<40
m & p-Xylene	M	2760	µg/kg	1	74000	<100	<100	<100
o-Xylene	M	2760	µg/kg	1	74000	<100	<100	<100
Methyl Tert-Butyl Ether	M	2760	µg/kg	1		<100	<100	<100
Naphthalene	M	2800	mg/kg	0.1	27000	<0.009	0.243	0.141
Acenaphthylene	N	2800	mg/kg	0.1	16700	<0.012	0.21	0.0648
Acenaphthene	M	2800	mg/kg	0.1	30000	<0.008	0.0287	0.0184
Fluorene	M	2800	mg/kg	0.1	27000	<0.01	0.126	0.0337
Phenanthrene	M	2800	mg/kg	0.1	27000	<0.015	0.999	0.393
Anthracene	M	2800	mg/kg	0.1	34000	<0.016	0.374	0.119
Fluoranthene	M	2800	mg/kg	0.1	6640	<0.017	2.13	0.966
Pyrene	M	2800	mg/kg	0.1	76000	<0.015	1.67	0.88
Benzo[a]anthracene	M	2800	mg/kg	0.1	607000	<0.014	1.15	0.662
Chrysene	M	2800	mg/kg	0.1	621000	<0.01	1.05	0.714
Benzo[b]fluoranthene	M	2800	mg/kg	0.1	3420	<0.015	1.24	0.747
Benzo[k]fluoranthene	M	2800	mg/kg	0.1	5050	<0.014	0.47	0.373
Benzo[a]pyrene	M	2800	mg/kg	0.1	34000	<0.015	1.13	0.775
Indeno[1,2,3-c,d]Pyrene	M	2800	mg/kg	0.1	25000	<0.018	0.729	0.614
Dibenz[a,h]Anthracene	N	2800	mg/kg	0.1	838000	<0.023	0.209	0.135
Benzo[g,h,i]perylene	M	2800	mg/kg	0.1	13000	<0.024	0.862	0.638
Total Of 16 PAH's	N	2800	mg/kg	2				
Resorcinol	M	2920	mg/kg	0.02				
Phenol	M	2920	mg/kg	0.02	3.05	<0.01	<0.01	<0.01
Cresols	M	2920	mg/kg	0.02		<0.01	<0.01	<0.01
Xylenols	M	2920	mg/kg	0.02	74	<0.015	<0.015	<0.015
1-Naphthol	N	2920	mg/kg	0.02				
Trimethylphenols	M	2920	mg/kg	0.02				
Total Phenols	M	2920	mg/kg	0.1		<0.035	<0.035	<0.035