

Llandarcy Outline Drainage Strategy

P02

June 2021

www.jbaconsulting.com

**Gerald D Harries & Sons Ltd
Rowlands View
Templeton
Narberth
Pembrokeshire
SA67 8RG**

JBA Project Manager

Tom Smith
JBA Consulting
35 Perrymount Rd
Haywards Heath
RH16 3BW

Revision History

Revision Ref/Date	Amendments	Issued to
P01 May 2021	-	David McClelland
P02 June 2021	Amendment to client address	Gerald D Harries & Sons Ltd

Contract

This report describes work commissioned by Gerald D Harries & Sons Ltd by an email dated 22nd April 2021. Clare Burnell and Tom Smith of JBA Consulting carried out this work.

Prepared by Clare Burnell BSc (Hons) MSc

Analyst

Reviewed by Tom Smith BSc (Hons) PIEMA

Analyst

..... Luke Virgo MEng CEng MICE

Senior Chartered Engineer

Purpose

This document has been prepared as a Final Report for Gerald D Harries & Sons Ltd . JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Gerald D Harries & Sons Ltd.

Copyright

© Jeremy Benn Associates Limited 2021.

Contents

1	Introduction	1
1.1	Terms of Reference	1
1.2	Site Description	1
1.3	Site Topography	1
1.4	Proposed Development	2
1.5	Utilities on Site	3
1.6	Summary of Surface Water Flood Risk	4
2	Existing Surface Water Drainage Regime	6
2.1	Geology and existing site drainage	6
2.2	Current site runoff rates	6
3	Surface Water Management Approach	7
3.1	Surface Water Drainage Proposal	7
3.2	Sustainable Drainage Systems	7
3.3	Design Criteria	7
3.4	Principles of SuDS	8
3.5	Existing Flow Paths	9
3.6	S1: Surface Water Runoff Destination	9
	Priority Level 1 – Water for re-use	10
	Priority Level 2 – Infiltration	10
	Priority Level 3 – Discharge to a surface water body	10
3.7	S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rates	10
3.7.1	Interception of Rainfall	10
3.7.2	Allowance for Climate Change	10
3.7.3	Discharge Limits	11
3.7.4	Tide Locking	11
3.7.5	Exceedance Events	12
3.8	S3: Water Quality	12
3.9	S4: Amenity Value	14
3.10	S5: Biodiversity	14
3.11	S6: Design for Construction, Maintenance and Structural Integrity	15
3.12	Health and safety	15
4	Proposed Surface Water Drainage Strategy	16
5	Conclusion	17
A	Extract from the Site Investigation Report	18
B	Proposed Development	19
C	Utilities on Site	20
D	Welsh Water Surface Water Sewer Maps	21
E	Microdrainage Calculations	22
F	Designers Risk Assessment	23
G	Outline Surface Water Drainage Strategy	24

List of Figures

Figure 1-1 Site Location	1
Figure 1-2 Site topography using NRW 1m LiDAR	2
Figure 1-3 Proposed development	3
Figure 1-4 Approximate location of utilities crossing the site	4
Figure 1-5 Risk of flooding from surface water and small watercourses	5
Figure 3-1 The Four Pillars of SuDS Design	7
Figure 3-2 Existing surface water flow direction	9
Figure 3-3 Exceedance flow routes	12
Figure 3-4 Example of a class 1 full retention separator (SPEL Products)	14

List of Tables

Table 2-1 Brownfield surface water runoff	6
Table 3-1 Extreme Sea Levels for the development site	12
Table 3-2 Pollution Hazard Indices from CIRIA C753 The SuDS Manual	13
Table 3-3 SuDS Mitigation Indices	13

Abbreviations

JBA	JBA Consulting
NRW	Natural Resources Wales
SuDS	Sustainable Drainage Systems

1 Introduction

1.1 Terms of Reference

JBA Consulting (JBA) were commissioned by Gerald D Harries & Sons Ltd to produce an Outline Surface Water Drainage Strategy for a site in Llandarcy, Skewen. This outline strategy shall be submitted to Neath Port Talbot SuDS Approval Body (SAB) for pre-application advice.

1.2 Site Description

The 1.2ha Brownfield site is located on an industrial estate in Llandarcy, Skewen as shown in Figure 1-1. The site is bound to the south by the Red Jacket Pill, with an industrial estate forming the remaining boundaries of the development. The River Neath is 460m east of the proposed development site.

Development is largely proposed in the northern 0.75ha of the site as shown in Figure 1-1.

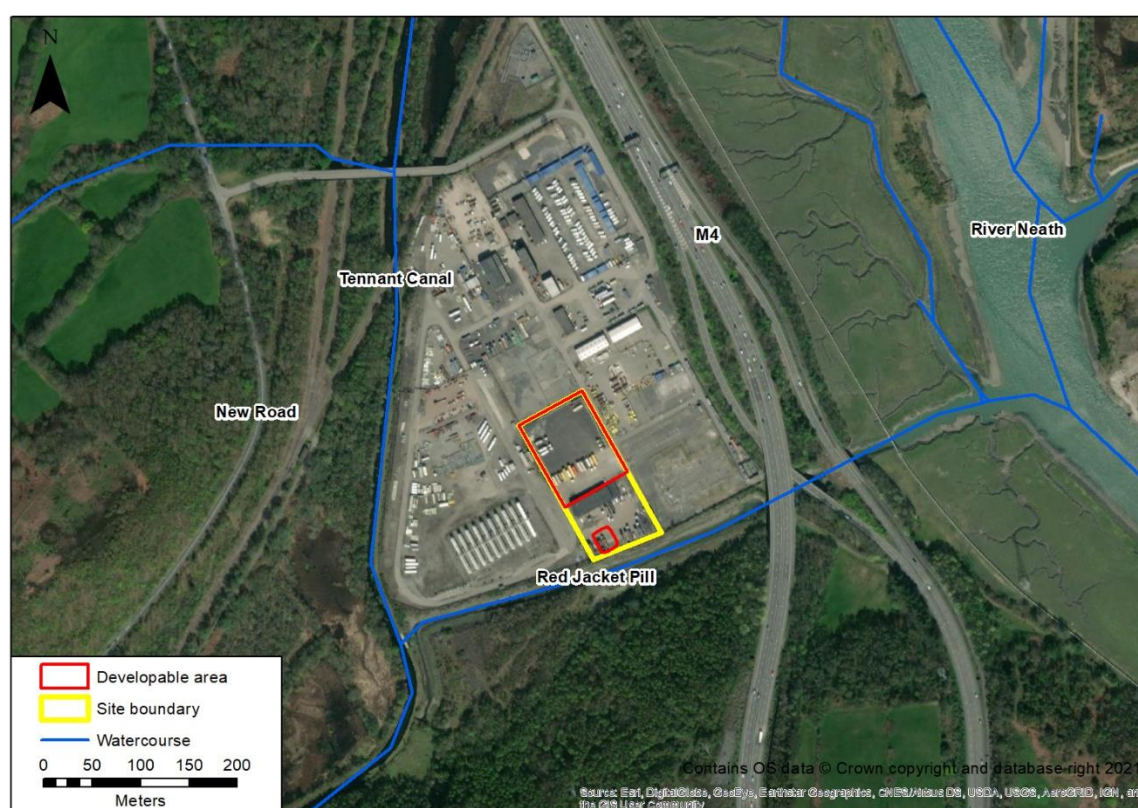


Figure 1-1 Site Location

1.3 Site Topography

Natural Resources Wales (NRW) 1m LiDAR data has been used to establish existing ground levels across the site, as shown in Figure 1-2. The site is relatively flat with an approximate ground level of 7.0 to 7.2mAOD across the site. An existing building in the southern part of the site (outside the proposed development area) appears to have been built on a plateau of 7.5mAOD. This building will be retained as part of the development.

As the site was a chemical works in the 1930s and gas works in the 1970s it is believed that the soil at the site is likely to be contaminated. As a result, the site is required to be capped to prevent the mobilisation of contaminants as highlighted in an extract of the site investigation report, Appendix A. As a result of the capping, ground levels will be raised by 200mm across the developable area of the site, with soft landscaped areas comprising of 600mm of new soil. Finalised ground levels were not available at the time of writing, but it

is known that the site will have a slight slope from east to west. Based on the details above it can be assumed that the post development ground level will be approximately 7.2 to 7.4mAOD.



Figure 1-2 Site topography using NRW 1m LiDAR

1.4 Proposed Development

An asphalt plant, asphalt storage area and LPG storage compound are proposed for the development site as shown in Figure 1-3 and Appendix B. An existing workshop, office and car parking in the south of the site will be retained in the proposed development.

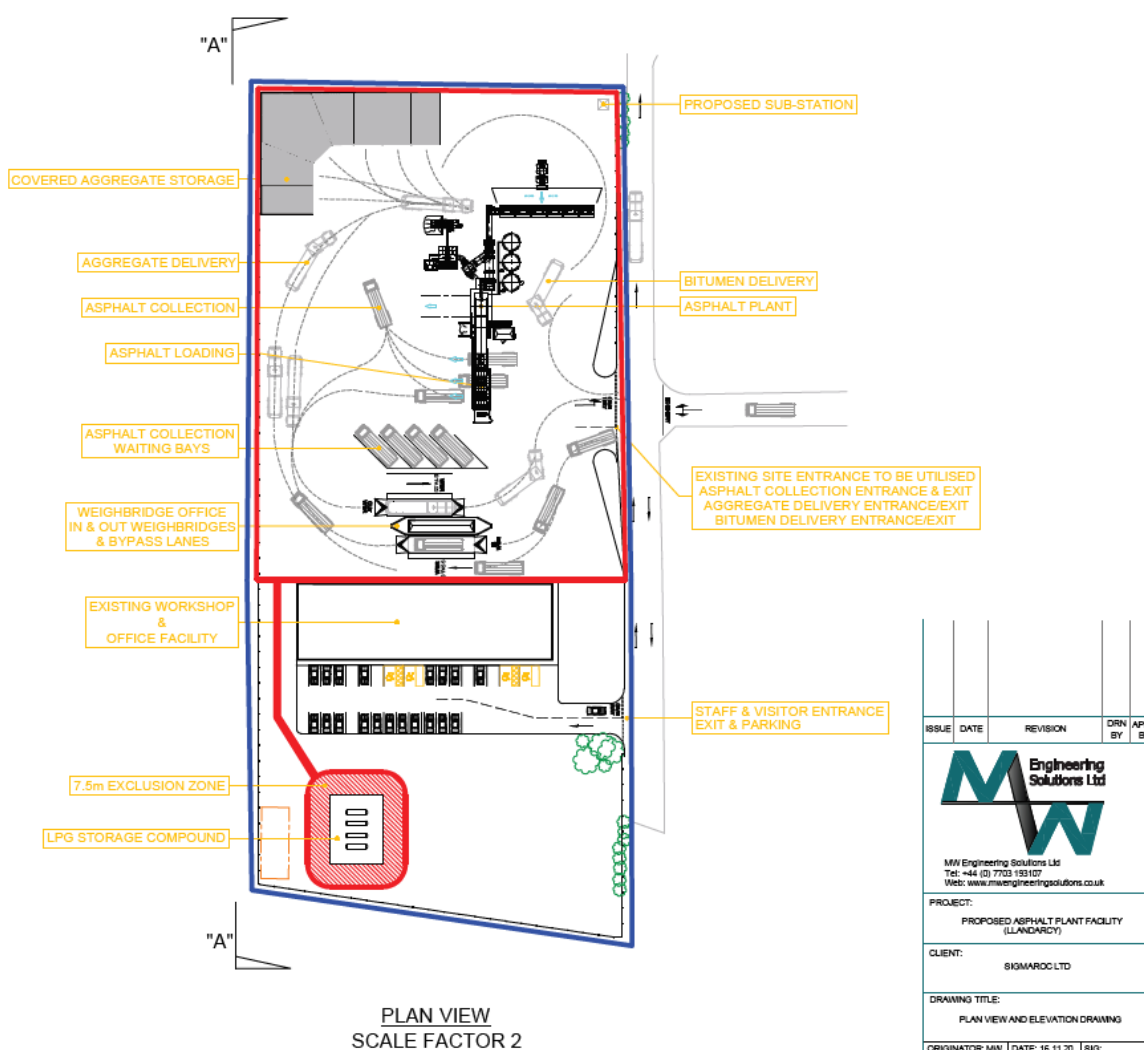


Figure 1-3 Proposed development

1.5 Utilities on Site

As part of early investigations into the site the client requested that gas and electricity searches were carried out, these can be found in Appendix C. A low voltage underground cable can be found along the western and much of the southern boundary of the site, as shown in Figure 1-4. A low pressure gas main can be found along the eastern and southern boundary of the development site as shown in Figure 1-4. There are no known restrictions in place on building close to these utilities or the depths these services could be underground. The surface water drainage system is designed to avoid disturbing these services based on a standard depth of a low voltage electric cable being 750mm¹ and a low pressure gas pipe being approximately 600mm². The exact location of these utilities should be confirmed at detailed design stage.

1 Wester Power (2019) Underground Cable Installation Manual. <https://www.westernpower.com.au/media/3551/underground-cable-installation-manual-part2-20191017.pdf> (Section 14.9)

2 Wales and West Utilities. Developers' Pack. https://wwutilities.co.uk/media/1235/wwu_developerspack.pdf

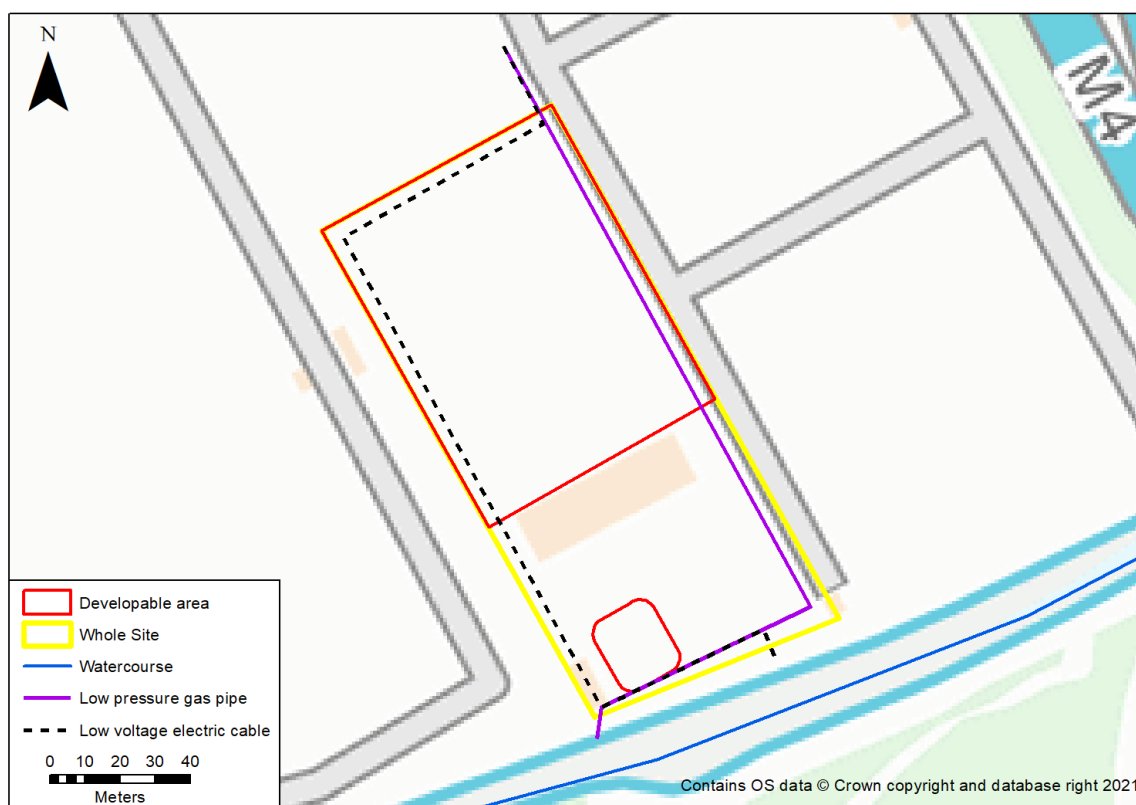


Figure 1-4 Approximate location of utilities crossing the site

1.6 Summary of Surface Water Flood Risk

Surface water flooding occurs when rain falling on saturated ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can also originate from surcharging blocked sewers or drains. Depending on the return period, sewer flooding can also occur from overloading of sewers due to their flow conveyance capacity being exceeded. This typically occurs in events exceeding the 1 in 30 year. Overland flow can therefore pose a risk to both the development site and surrounding land. Overland flows may originate from the site itself or adjoining from land at a higher elevation from which flow migrates onto the development area.

The Natural Resources Wales (NRW) Flood Risk Assessment Wales (FRAW) maps, show the risk of flooding from surface water and small watercourses, shown in Figure 1-5. This identifies a very low risk of surface water flooding to the whole site.

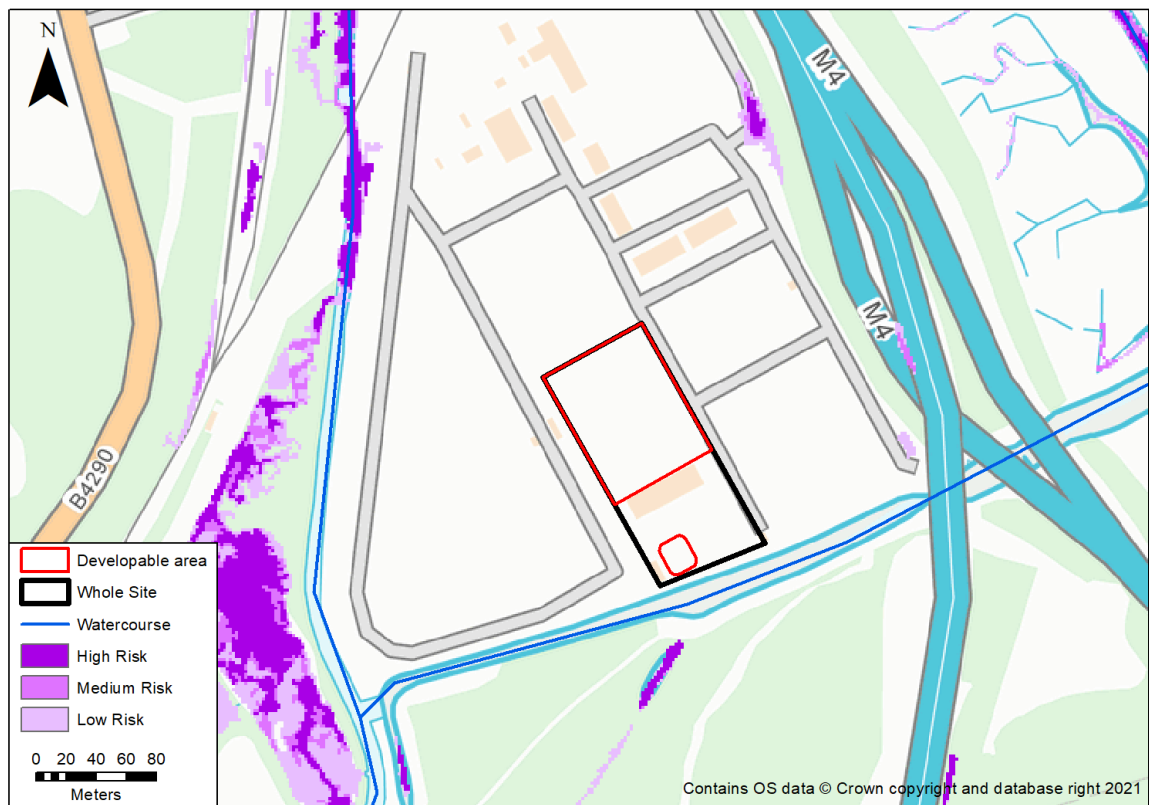


Figure 1-5 Risk of flooding from surface water and small watercourses

2 Existing Surface Water Drainage Regime

2.1 Geology and existing site drainage

The Geology of Britain Viewer³ identifies that the proposed site is underlain by Brithdir Member which is comprised of Sandstone. Superficial deposits are categorised as Tidal Flat Deposits comprised of clay, silt and sand. The Soilscales viewer⁴ describes the soils across the site as loamy and clayey floodplain soils with naturally high groundwater.

Due to the industrial nature of the site the soil is likely to be highly compacted, making infiltration unlikely. The primary drainage route is likely to be run-off towards the Red Jacket Pill on the southern boundary of the site.

2.2 Current site runoff rates

Table 24.1 of the SuDS Manual⁵ indicates that the FEH methods (FEH Statistical and ReFH) should be the preferred methods for calculating peak runoff rates. This is supported by Natural Resources Wales GN008 Flood Estimation: Technical Guidance and Environment Agency research by Faulkner et al which concluded that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods such as IH124 and ADAS 345 where possible.

ReFH2 was used to calculate peak Brownfield runoff rates for the current site. The developable area of the site is 0.75 Ha. An urbanisation factor of 1.0 (100%) has been applied to represent the existing area of brownfield development across the site. Catchment descriptors were extracted from the FEH Web Service. The calculated runoff rates are shown in Table 2-1.

Table 2-1 Brownfield surface water runoff

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
1	19.8	14.8
QBAR	22.2	16.7
30	43.7	32.7
100	54.2	40.7

3 Geology of Britain Viewer: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html?>

4 Landis Soilscales viewer: <http://www.landis.org.uk/soilscales/>

5 The SuDS Manual (C753), CIRIA 2015. <https://www.ciria.org>.

3 Surface Water Management Approach

3.1 Surface Water Drainage Proposal

An outline surface water drainage proposal for the site has been developed which will aim to control surface water runoff without increasing flood risk to other developments or impacting on water quality downstream. The development of the drainage strategy is via a number of steps where drainage objectives, options and estimated sizes of features are determined. Further detailed design of the drainage scheme will be determined once an agreement in principle has been received from the SuDS Approval Body (SAB).

This outline drainage strategy discusses each SuDS standard in turn and details the way in which the proposed surface water drainage strategy will comply with each standard.

3.2 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and also aims to reduce the runoff rates and volumes during storm events, whilst providing water treatment benefits. SuDS also have the advantage of providing Blue and Green Infrastructure and ecology and recreational benefits when designed and maintained properly.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1:

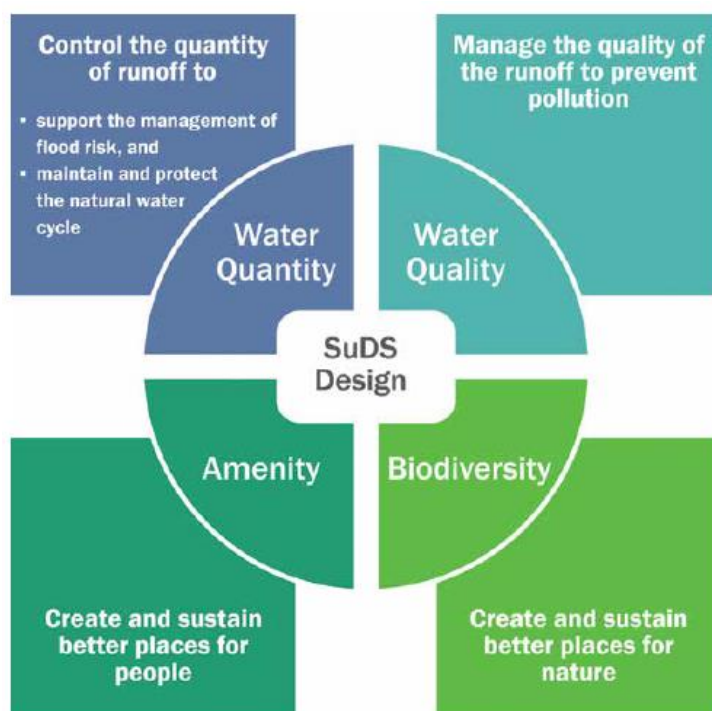


Figure 3-1 The Four Pillars of SuDS Design

3.3 Design Criteria

The following national guidance documents and design standards have been considered when developing this outline surface water drainage strategy:

- C753 The SuDS Manual (Ciria, 2015)
- Rainfall Runoff Management for Developments – SC030219 (Environment Agency, 2013)

- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems (Welsh Government, 2018)
- Planning Policy Wales – Edition 9, November 2016
- The Building Regulations 2010 Part H: Drainage and Waste Disposal
- Appendix C of the Sewerage Sector Guidance

Neath Port Talbot Council do not currently have county wide SuDS guidance. During detailed design of the proposed surface water drainage system, should any countywide guidance be available, it should be consulted to ensure the system is designed in line with the aspirations and requirements of the SAB.

3.4 Principles of SuDS

The proposed surface water drainage scheme complies with the standard principles of SuDS in the following way:

- Wherever possible across the site, water is managed as close to the surface as possible through the use of filter strips, channel drains and a wet swale/ wetland which conveys flows across the site.
- Rainwater is treated as a valuable natural resource across the site by using natural topography to influence drainage proposals. Water is kept as close to the surface as possible through the use of filter strips, channel drains and a wet swale/ wetland. SuDS assets will provide amenity and biodiversity benefits across the site.
- Across the site, rainfall shall be managed to help protect people from increased flood risk through the implementation of source control techniques such as the wet swale/ wetland.
- Rainfall will be managed across the site to ensure that the site does not flood during the 1 in 30-year event, and buildings will not flood during the 1 in 100-year event plus 20% for climate change.
- During detailed design, a 20% climate change allowance will be applied to peak rainfall intensity and design inflows.
- A SuDS Management Train is included across the site as water is intercepted at source via the filter strip and channel drain which flows into the wet swale/ wetland before discharging into the watercourse on the southern boundary of the site. The Simple Index Approach, in line with C753, will be used to demonstrate how surface water shall be managed to ensure that the proposed development shall not have a detrimental effect on water quality.
- Biodiversity and amenity benefits are maximised across the site wherever possible. The use of a wet swale/ wetland increases opportunities for habitat creation and aids to promote a sense of well-being for site employees.
- We propose to make the best use of available land by working with the existing ground alteration proposals including the requirement to raise ground levels by 200mm across the site.
- To ensure that the scheme performs reliably and effectively for the lifetime of the development, a maintenance plan shall be produced during detailed design stage. The plan will detail the management and maintenance requirements of the proposed SuDS system to ensure that it functions to its optimal capacity in perpetuity. Prior to operational use on site, a designer's risk assessment shall be carried out to ensure that all SuDS assets are safe and fit for purpose.

- All surface water shall be drained via gravity towards the watercourse on the southern boundary of the site via the wet swale/ wetland.
- During detailed design stage, further information shall be provided on the affordability in terms of long-term maintenance costs through provision of a SuDS maintenance plan. The amenity and environmental benefits of the scheme are detailed in Section 3.9 and 3.10. At detailed design stage, further information shall be provided within an Amenity and Biodiversity Plan.

3.5 Existing Flow Paths

As the site is very flat it is difficult to conclude the indicative flow paths across the development. However, from the slight gradient on the site, it is likely that surface water flows in a southerly direction before discharging into the Red Jacket Pill as shown in Figure 3-2. It is envisaged that this flow path shall be retained, where possible, through site development and exceedance flow paths shall be considered further in Section 3.7.5.



Figure 3-2 Existing surface water flow direction

3.6 S1: Surface Water Runoff Destination

The statutory standards for SuDS in Wales address the use of surface water by the development and where it should be discharged. It has developed a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

- Priority Level 1: Surface water runoff is collected for reuse
- Priority Level 2: Surface water runoff is infiltrated to ground
- Priority Level 3: Surface water runoff is discharged to a surface water body
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
- Priority Level 5: Surface water runoff is discharged to the combined sewer

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

Priority Level 1 – Water for re-use

The potential for surface water re-use within any heavily industrial development is likely to be limited due to low demand. In addition, the surface water is likely to contain high amounts of sediment, pollution and contaminants. It is not recommended that surface water is reused on the site.

Priority Level 2 – Infiltration

Due to the contaminated nature of the site and the requirement for the site to be capped, infiltration is not seen a viable option. Any SuDS features on site should be lined to prevent infiltration and mobilisation of contaminants.

Priority Level 3 – Discharge to a surface water body

As infiltration is not seen as a viable option for the site, discharging surface water to a watercourse should be considered. The Red Jacket Pill on the southern boundary of the site would be a suitable discharge location. As the watercourse is influenced by the tide there is no requirement for flows from the site to be attenuated, see section 3.7.3 for more details. Consideration for potential tide locking of the outfall has been explored in section 3.7.4.

As the watercourse is considered to be a viable discharge location, priority level 4 and 5 do not need to be considered. Please note that for this site priority level 4 and 5 could not be considered as there are no public surface water sewers or combined sewers in the areas, see Appendix D for further information.

3.7 S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rates

There are typically three design storm events which should be considered when designing the SuDS system for managing flows and volumes:

- 1 in 1 year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted.
- 1 in 30 year storm event, where surface water flooding of the site is not permitted at this frequency.
- 1 in 100 year storm event with allowances for future climate change, where runoff should be managed within the extents of the development site, ensuring that it cannot affect people or properties either within the development or surrounding developments.

3.7.1 Interception of Rainfall

When rainfall takes place on greenfield sites there is, for the majority of rainfall events, no runoff from a site due to evapotranspiration or groundwater recharge. Therefore, interception mechanisms are based on runoff volume reduction using evapotranspiration and infiltration processes. A simplified approach to interception can be used based on assumed compliance of various drainage components. Table G2.1 of the statutory standards for SuDS in Wales lists the interception drainage components which have assumed compliance. This includes the wet swale/ wetland and filter drains that are proposed for the site.

3.7.2 Allowance for Climate Change

The Welsh Government has produced Adapting to Climate Change guidance⁶ which contains updated representative climate changes allowances for Wales for peak flows. The guidance contains indicative sensitivity ranges for peak rainfall intensity. As the proposed development site is heavily industrial in nature, the assumed lifetime of development is 75 years, and as such the 2070-2115 estimate should be used. The recommended climate change factor for small catchments using the Central estimate for the 2070-2115 epoch is 20%.

3.7.3 Discharge Limits

As the Red Jacket Pill is tidally influenced there is no requirement to attenuate flows from the development site, this is in line with Standard G2.1 of the Statutory Standards for SuDS⁷:

"Where the surface water body is unaffected by either the discharge rate or volume of runoff (e.g. an estuary, the sea or a water body identified in the Local Flood Risk Management Strategy [LFRMS] as not needing hydraulic control of runoff to it), the hydraulic management control requirements are limited to the drainage service provisions for the site and adjacent areas that could be affected by the performance of the drainage system."

Furthermore, there are no developments downstream of the site which could be at increased risk of flooding as a result of the development. Therefore, flows from the site will be unattenuated and there is no requirement for surface water storage.

3.7.4 Tide Locking

Due to the tidal influence of the Red Jacket Pill it must be ensured that the outfall from the site is not affected by tidal locking. This occurs where the water level in the watercourse rises above the level of the outfall from the development site, preventing water from being discharged. This causes a build up of water on the site and if not probably managed can lead to flooding of the site.

Extreme Sea Level Estuary data was used to understand the current and predicted sea levels in proximity to the development site. The nearest data point to the proposed development site was 484_3 which is located 500m north east of the site. As the development has a proposed lifetime of 75 years due to its commercial nature, the 2096 predicted tidal levels for the 20 and 25 year event were calculated, which reflect 75 years of climate change related sea level rise. The current extreme levels were amended using the latest Welsh Government climate change guidance⁸ to predict 2096 levels. The 2096 predicted extreme tidal level is 6.83mAOD and 6.86mAOD for the 20 and 25 year events respectively as shown in Table 3-1.

This shows that the outfall is at risk of surcharging during extreme sea level events. JBA built a representation of the proposed surface water drainage scheme in Microdrainage to understand whether the site would be at risk of flooding if the outfall was surcharged. As a tidal curve was not available for the development site the model was run for a 6 hour period with the outfall constantly surcharged. This is a very conservative estimation as the outfall is unlikely to be surcharged for this period of time as the average water level in the Red Jacket Pill is 4.8mAOD.

The results show that during the 1 in 30 and 1 in 100 year critical events the proposed SuDS system is able to store the surface water which cannot be released in to the watercourse due to the outfall being surcharged. As a result, the site is flood free during both the 1 in 30 year and 1 in 100 year events. Results from Microdrainage can be found in Appendix E.

To prevent flood risk to the site as a result of tidal surges a flapped valve will be fitted to the outfall of the pipe to prevent water being forced on to the site.

6 Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales:

<https://gov.wales/sites/default/files/publications/2019-06/adapting-to-climate-change-guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales.pdf>

7 Statutory Standards of SuDS (2018) <https://gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf>

8 Climate Change allowance for planning purposes. Welsh Government 2016

Table 3-1 Extreme Sea Levels for the development site

Description	2021 level (mAOD)	2096 level (mAOD)
20 year	6.10	6.83
25 year	6.13	6.86
Level of outfall*	5.70	5.70

*From a high level assessment, the outfall from the surface water drainage system is expected to be 5.70mAOD. This may change slightly during detailed design as site levels are confirmed.

3.7.5 Exceedance Events

Extreme events exceeding the design event could occur and may result in overland flows across the site. It is envisaged that exceedance flow routes shall be retained in the SuDS features across the development and in access roads across the site as shown in Figure 3-3.

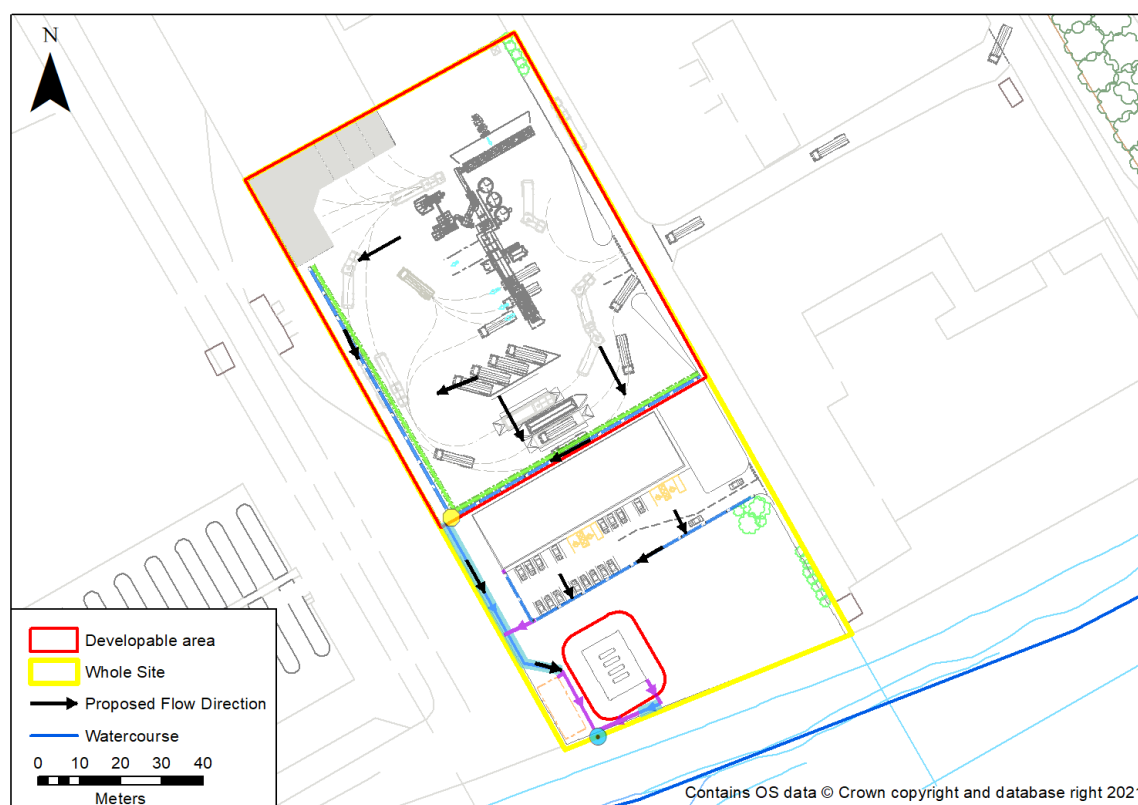


Figure 3-3 Exceedance flow routes

3.8 S3: Water Quality

The surface water drainage system should provide a sufficient level of water quality treatment to prevent pollution of receiving waterbodies. During the water treatment design event (5mm rainfall across the entire site) no runoff should leave the site. This is usually achieved through source control techniques such as permeable pavements and detention basins.

Table 4.3 of the SuDS Manual advocates the use of the "simple index approach" to determine an appropriate level of pollution mitigation for development sites. This splits pollution into three contaminant types (Total Suspended Solids, Metals and Hydrocarbons) and assigns a

"pollution hazard index" to each type. Different SuDS features are then assigned a "SuDS Mitigation Index" and sufficient treatment is deemed to be provided if the "SuDS Mitigation Index" is equal to or greater than the "pollution hazard index" for each pollutant type. When more than one SuDS component is required a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

As the proposed development is for heavy industrial purposes, it is defined as having a 'High Pollution Level' classification in line with Table 26.2 in the CIRIA SuDS Manual. The "pollution hazard indices" for a high pollution hazard site are given in Table 3-2 below.

Table 3-2 Pollution Hazard Indices from CIRIA C753 The SuDS Manual

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.8	0.8	0.9

Table 26.3 of the SuDS Manual provides indicative SuDS mitigation indices for discharges to surface water.

The proposed development will use one main SuDS treatment train to manage drainage on site and mitigate the Pollution Hazard Indices. The filter strip will filter water from the proposed development before it enters a Class 1 full retention separator. The water from the separator will be discharged to the wet swale/ wetland on the western boundary of the site, providing further treatment to the water. Table 3-3 demonstrates sufficient mitigation of potential contaminants by the SuDS features proposed for the site.

Table 3-3 SuDS Mitigation Indices

Conveyance route	Pollution Mitigation index for Filter Strip	Pollution Mitigation index for Separator	Pollution Mitigation index for Wet Swale/Wetland	Total Pollution Mitigation Index	Sufficient Mitigation Supplied?
Filer Strip > Separator*>Wet Swale/Wetland	TSS: 0.4 Metals: 0.4 Hydrocarbons: 0.5	TSS: Unknown Metals: Unknown Hydrocarbons: Unknown	TSS: 0.4 Metals: 0.4 Hydrocarbons: 0.4	TSS: 0.8 Metals:0.8 Hydrocarbons: 0.9	Yes

*The CIRIA SuDS Manual does not provide pollution mitigation indices for separators and as such values for this feature have not been included in the above calculations. However, a separator on the site will help to reduce levels of TSS, Metals and Hydrocarbons and any reduction in these pollutants as a result of the separator will be in addition to those already provide by the SuDS features.

Due to the sites high pollution hazard level a Class 1 full retention separator is required on site to remove oil and sediment from the surface water in line with the Pollution Prevention Guidelines⁹ (PPG3) and the Ciria SuDS Manual. Water will enter the separator and pass through several chambers where sediment will sink to the base of the chamber and oils will

9 PPG3 (2016) Use and design of oil separators in surface water drainage systems: <https://www.netregs.org.uk/media/1671/ppg-3.pdf>

float on the surface. The treated water will then leave the separator via a pipe as shown in Figure 3-4.

In line with the PPG3 guidelines the separator will also require a visual and audible alarm to alert site users when the level of oil reaches 90% of the storage volume. When the alarm is triggered the separator tank should be emptied to ensure that it works effectively. A detailed maintenance plan for the separator will be provided at detailed design stage.



Figure 3-4 Example of a class 1 full retention separator (SPEL Products)

The remediation strategy for the site will need to take into consideration the size and depth of excavation for the oil separator and associated pipework. The separator must have a minimum of 0.5m of ground cover above the tank.

As the site is classed as having a High Pollution Hazard Level any discharges from the site may require an environmental licence or permit. This is especially relevant to the asphalt storage area found to the north of the site. Pre-permitting advice must be sought from Natural Resources Wales prior to detailed design work.

3.9 S4: Amenity Value

The design of the surface water management system should maximise amenity benefits across the site. SuDS components can enhance the provision of high-quality, attractive public space which can help to provide health and well-being benefits, they improve liveability for local communities and they contribute to improving the climate resilience of new developments.

The aim of Standard 4 is to ensure that wherever possible and having regard to the need to prioritise infiltration drainage, the SuDS scheme makes the best contribution towards maximising benefits for amenity.

Within the development site, a wet swale/ wetland is used which will provide amenity value through aesthetics making the site a more pleasant areas to work on. The wet swale/ wetland and filter strip will also assist in the climate resilience of the development, promoting carbon sequestration across the site. Green SuDS have the potential to improve productivity of the site due to the improved quality of the working environment.

3.10 S5: Biodiversity

The surface water drainage system should seek to enhance any existing habitats within the site and complement any neighbouring habitats. The ecological potential of the SuDS system can be maximised by utilising local planting. The strategy should create a range of habitats and provide varied water depths within the SuDS features which should be sustained by ensuring that an effective management regime is implemented.

Although green space across the development site is limited the filter strip and wet swale/wetland can be planted with native species of varying heights to provide a range of habitats across the site, to encourage local habitat creation. It can also help to encourage wildlife corridors between the Red Jacket Pill, River Neath and the site. Although not directly SuDS features, any green areas between lorry parking spaces on the site can help to create wildlife corridors, especially if trees are present on the site.

3.11 S6: Design for Construction, Maintenance and Structural Integrity

The national SuDS standards state that components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.

Schedule 3 of the Flood and Water Management Act was implemented in Wales on the 7th January 2019. Under this legislation, SuDS that serve multiple properties must be approved and adopted by the SuDS Approval Body (SAB) – a function performed by the Lead Local Flood Authority at Neath Port Talbot County Council. In the case of the proposed heavy industrial use of the site, the SuDS will serve a single curtilage and therefore the Client shall have the management and maintenance responsibilities for the proposed surface water drainage system. A detailed management and maintenance plan for the proposed system shall be provided at detailed design stage.

3.12 Health and safety

The surface water drainage system should be designed so that it minimises health and safety risk to the site occupants. SuDS are sometimes perceived as unsafe features with fears of drowning and overturning cars, but with correct design, these risks can be mitigated. A CDM Designers Risk Assessment has been undertaken demonstrating that the proposed surface water drainage system is fit for purpose, with risks designed out of the proposal, or mitigated wherever necessary. The Designers Risk Assessment can be found in Appendix F.

4 Proposed Surface Water Drainage Strategy

The proposed surface water drainage strategy can be found in Appendix G.

Water has been kept as close to the surface as possible in using filter strips, channel drains and wet swales/ wetland.

Filter strips should be placed along the southern and western sections of the developable area of the site. These strips will help to remove larger sediments from the surface water before the water enters the channel drains and oil separator. Due to the highly industrial nature of the site it is recommended that dense planting alongside grass is used within these filter strips to remove the large volume of sediments likely to come from the site.

Surface water from the filter strips will flow into adjacent channel drains. The channel drains will have a slight gradient to convey the surface water to the class 1 full retention separator. Water will enter the separator and pass through several chambers where sediment will sink to the base of the chamber and oils will float on the surface. The treated water will then leave the separator via a pipe and into the wet swale/ wetland.

The wet swale/ wetland should be planted with a variety of native wetland species including reeds, sedges and rushes to suit the varying conditions found along the banks of the swale e.g. wet conditions at the base and drier towards ground level. This increases the amount of treatment the surface water receives in addition to having aesthetic and biodiversity benefits for the development site. Due to the depth of the wet swale/ wetland, further consideration of measures to ensure safety of these features will be required at detailed design stage. Surface water will be conveyed to the south of the site by the wet swale/ wetland where it will flow into a pipe before discharging at an unattenuated rate into the Red Jacket Pill.

Surface water from the LPG gas storage areas will enter a small area of wet swale/ wetland before connecting to the main outfall for the site. A flapped valve will be fitted to the outfall of the pipe to prevent any flooding of the site as a result of tidal surges.

Due to the high pollution nature of the site the SuDS features should be regularly checked for the build-up of sediments and for visible signs of pollution to ensure that all features function at optimal capacity. All SuDS features should be lined to ensure that infiltration is prevented to stop the mobilisation of contaminants.

5 Conclusion

- JBA Consulting were commissioned by Gerald D Harries & Sons Ltd to produce an Outline Surface Water Drainage Strategy for a site in Llandarcy.
- The site is relatively flat with an approximate ground level of 7.0 to 7.2 mAOD across the site.
- The site is currently Brownfield in nature and the Red Jacket Pill forms the southern boundary of the wider site.
- The development of an asphalt plant is proposed for the northern area of the wider site.
- The site is underlain by Brithdir Member which is comprised of Sandstone.
- Infiltration is not recommended for the site due to heavy compaction of the soils from the industrial nature of the site and the potential to mobilise contaminants. The site will be capped and all SuDS features lined to prevent movement of contaminants.
- Brownfield runoff rates have been calculated as 16.7 l/s for the QBAR return period, however due to the tidal nature of the Red Jacket Pill surface water flows from the site will not be attenuated.
- Modelling the proposed surface water system on Microdrainage showed that the site will not flood as a result of tide locking in an extreme sea level 25 year event for the critical 1 in 30 and 1 in 100 year rainfall events.
- Sufficient pollution mitigation is provided on site by the use of filter strips, a class 1 full retention separator and wet swales/wetlands. However, Natural Resources Wales must be consulted before detailed design stage to ascertain whether a discharge consent will be needed for the asphalt storage area to the north of the site or whether extra levels of treatment would be required for this area.
- The remediation of the site needs to allow space for the separator to be installed.
- The drainage system shall work to provide multiple amenity and biodiversity benefits and ensure water quality is not adversely affected as a result of the development. This will be achieved through native planting in and around the wet swales/ wetlands providing a more aesthetically pleasing areas for site employees.
- Surface water will be discharged at an unattenuated rate, via a flapped outfall, to the Red Jacket Pill to the south of the site.
- A detailed maintenance plan for the surface water drainage strategy shall be provided during Detailed Design.

Appendices

A Extract from the Site Investigation Report

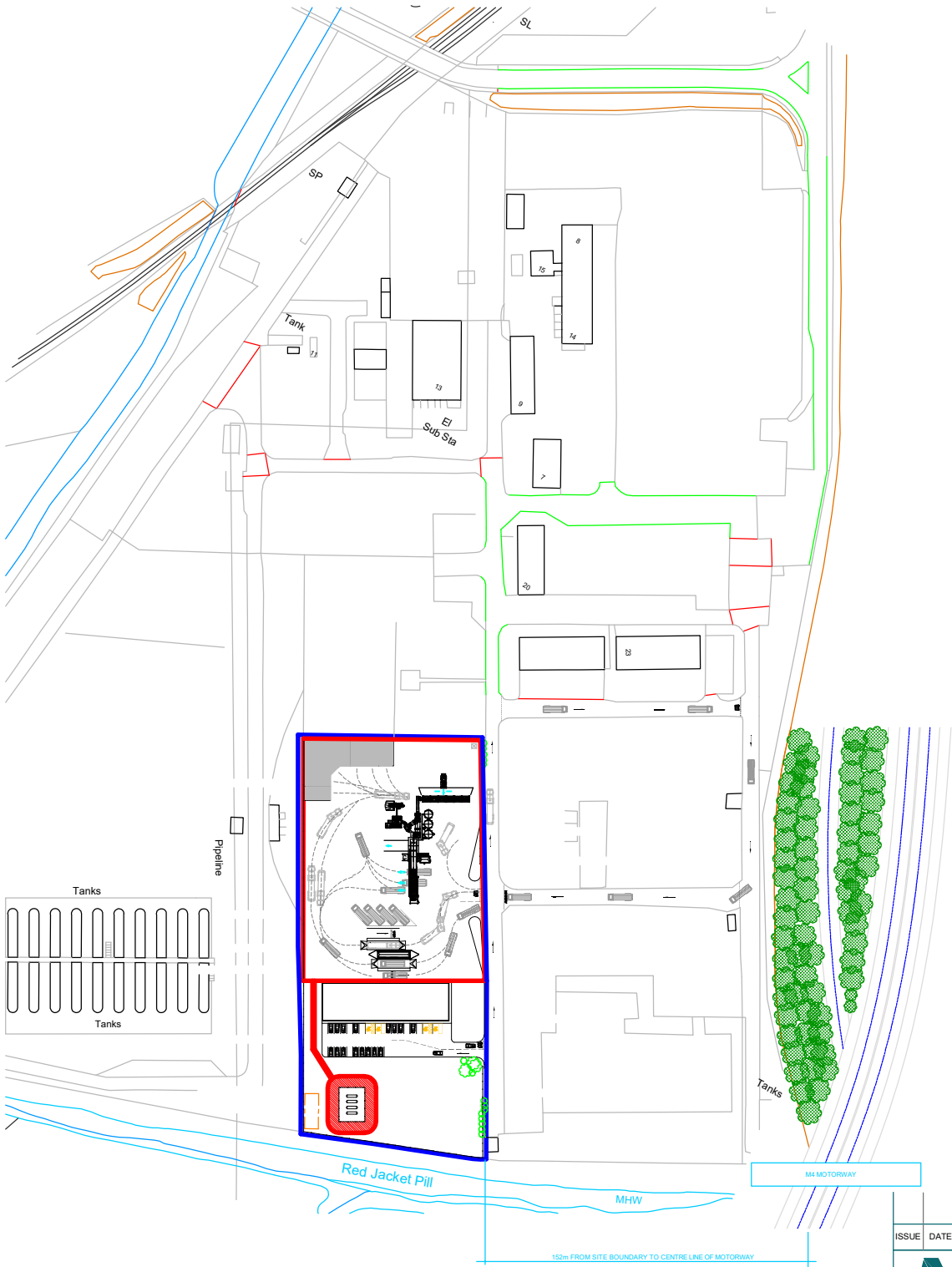
Executive Summary

Site Location and Proposed Development	Gerald D Haines and Sons Limited is proposing the development of commercial premises at Edwards Works, Skewen, Swansea SA10 6JY.		
Site History	The site operated as Briton Ferry Chemical Works until the late 1930's. During the 1940's the chemical works was demolished. In the early 1970's the site became a gas works. The site has not undergone significant change since this period.		
Geology	The site is underlain by the Birthdir Member. Above the bedrock is tidal flat deposits. Made ground is likely to cover the site.		
Radon	No radon protective measures are required for new developments on the investigation site.		
Coal Mining Risk Assessment	The site is not within a surface area that could be affected by any past recorded underground coal mining.		
Ground Conditions	Depth (m)	Thickness (m)	Stratum
	0.00 - 30	0.30 0.30 2.20 1.90	MADE GROUND. [Medium dense] grey sandy GRAVEL of angular asphalt and sandstone. MADE GROUND. [Dense] grey mottle light brown sandy GRAVEL with high cobble and low boulder content. Gravel, cobbles, and boulders are angular slag.
Contamination of Concern	Lead and chrysotile (asbestos)		
Remediation and Mitigation Measures	The advice of an asbestos specialist will be required and as a minimum the following precautions should be employed: • Dust suppression and measures to dampen the material • Suitable PPE for site workers • Air monitoring on the site boundary • Personal air monitors (for a time to determine actual personnel / fibre interaction) In addition to the above it is best practise to clean down plant and change air filters on any plant used in the works with asbestos contaminated material. To protect future site users from the identified contamination the site will need to be capped. The capping should consist of the proposed buildings and hard standings. In landscaped areas the capping should consist of 600mm of suitable inert soil. The soft landscaping should be underlain by a no-dig barrier comprising a geogrid and geotextile membrane to prevent excavation beyond the capping layer and mixing between the capping and contaminated made ground.		
Foundation Solution	It is recommended that reinforced concrete strip foundations be used; founded within the made ground at an approximate depth of 0.75m below the existing ground level. An allowable bearing pressure of 100kN/m² may be used for strips up to 750mm wide. Foundations must sit at least 200mm within the founding horizon.		

For the given foundation solutions and bearing pressure, maximum total settlements of 25mm should result with differential movements of the superstructure not exceeding 1:750.

Floor slabs may be designed as reinforced ground bearing.

B Proposed Development



PLAN VIEW

CONSTRUCTION AREA	BOUNDARY AREA
7,586 sq/m	12,157sq/m
1.875 Acres	3.004 Acres
0.759 Hectares	1.215 Hectares

 MW Engineering Solutions Ltd Tel: +44 (0) 7703 193107 Web: www.mwengineeringsolutions.co.uk			DRN BY	APP BY
ISSUE	DATE	REVISION		
PROJECT:			PROPOSED ASPHALT PLANT FACILITY (LLANDARCY)	
CLIENT:			SIGMAROC LTD	
DRAWING TITLE:			SITE DEVELOPMENT DRAWING	
ORIGINATOR: MW	DATE: 16.11.20	SIG:		
CHECKED: MW	DATE: 16.11.20	SIG:		
MWES DRAWING No.: SIGMAROC - LLANDARCY - SITE DEVELOPMENT DRAWING				
CLIENT DRAWING No:			SHEET SIZE A2	
N/A				
REVISION:	SCALE:	SHEET No.		
	1:1.25	1 OF ***		

C Utilities on Site

Date of Order: 24/11/2020
Case Number: 1630655
Client Reference: 21263392

PROPERTY MADE SUBJECT TO SEARCH
Former LP Gas Premises Edwards Works
Llandarcy Neath
SA10 6JY

CLIENT DETAILS

TM Group Ltd
1200 Delta Business Park WELTON ROAD
SWINDON
SN5 7XZ

Gas Search (distribution infrastructure)

PROCESSED BY:

Conveyancing Data Services Limited
4 The Pavilions
Ruscombe Business Park
Ruscombe
RG5 3JP

Tel: 01189 690 839

Email: info@conveyancingdata.com

Company Reg No. 07159470 VAT Reg No: 988993907



Notes: This report is subject to Conveyancing Data Services Ltd's terms and conditions which can be viewed at www.conveyancingdata.com. It is also subject to the terms and conditions of the data provider.

**Company Address**

Wales and West Utilities Ltd,
Wales and West House,
Spooner Close, Celtic,
Springs, Coedkernew,
Newport, NP10 8FZ

Our Ref: 20623938 1630655

Tuesday, 24 November 2020

Conveyancing Data Services
61-63 Crockhamwell Road
Woodley
Berkshire
RG5 3JP

Dear Conveyancing Data Services

Thank you for contacting us regarding Wales & West Utilities equipment at the above site.

I enclose an extract from our mains records of the area covered by your proposals together with a comprehensive list of General Conditions for your guidance. This information is given as a general guide and its accuracy cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc., are not shown but their presence should be anticipated.

Where the Wales & West Utilities (WWU) plan includes a warning label about our higher pressure apparatus you must contact the WWU dig team for further guidance. If it is deemed that a site visit is required for this location we require a minimum of 10 days' notice to arrange a site visit for our engineers to give further guidance. Depending upon the nature of the works the site visit may be deemed chargeable.

No liability of any kind whatsoever is accepted by Wales and West Utilities (WWU), its agents or servants for any error or omission. Please note that all WWU equipment on site should be assumed to be LIVE until proven otherwise.

Safe digging practices, in accordance with HS(G)47, Avoiding Danger from underground services must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. Safe working procedures should be defined and practiced.

Irrespective of whether the pipeline is directly affected by the proposed development I enclose for information our general requirements for working in the vicinity of gas pipelines operating above 2 barg (T/SP/SSW22). It is our strong recommendation in the interests of safety that these general requirements be adhered to.

There are minimum proximity distances for buildings from WWU mains depending on both the operating pressure and the material of the main. Advice should be sought from WWU prior to building works taking place to confirm these distances. For High Pressure pipelines you must seek further guidance from the HSE and Local Authority Planning team regarding their LUP distances regarding building proximities as these may be in addition to WWU proximity distances for a pipeline.

In the presence of our >2barg gas pipelines no excavations are to take place within 10m of the confirmed position of these mains without prior consultation with WWU.

WWU reserves its position completely to enforce the terms of any existing easement against the landowner, even if this results in any planning permission granted not being able to be fully implemented.

**Company Address**

Wales and West Utilities Ltd,
Wales and West House,
Spooners Close, Celtic,
Springs, Coedkernew,
Newport, NP10 8FZ

You must not build over any of our plant or enclose our apparatus.

Where diversions to WWU apparatus are needed to allow change to occur on site, the cost of these alterations may be charged to the persons responsible for the works.

If you have requested a new connection the WWU connections team will where necessary prepare detailed proposals and provide a quotation for any necessary alterations and/or development of our equipment on the site.

If you require advice in connection with your proposals please contact the relevant number below.

Yours sincerely,
WWU Dig Team

Gas Emergency Number:

In an emergency call 0800 111 999, 24 hours a day.

Mapping Enquiries:

If you have an enquiry relating to this letter or the attached map plan, please contact us using the following information:

Telephone 02920 278912
Email dig@wwutilities.co.uk

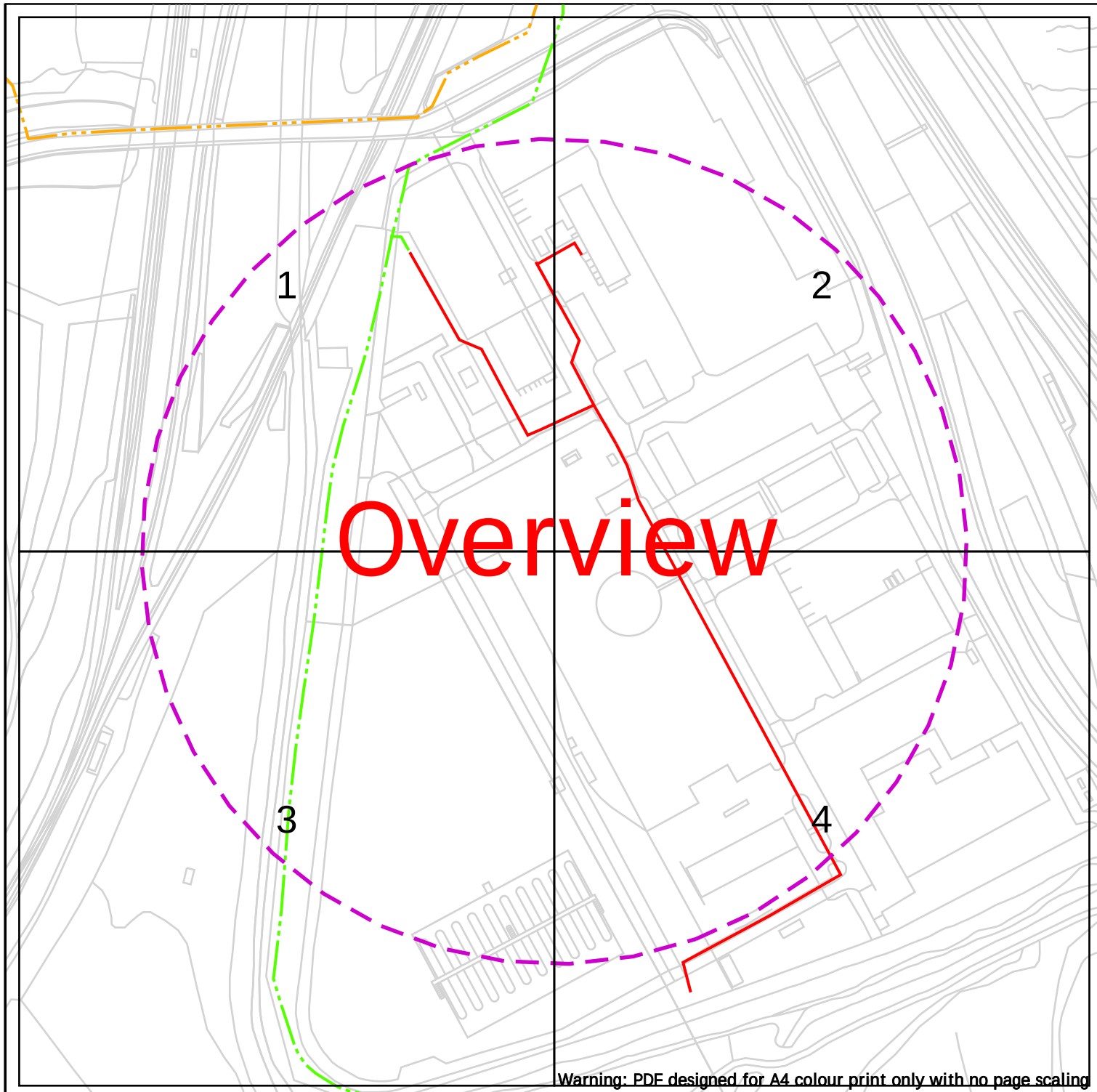
General Enquiries:

If you have a general enquiry, please call us on the following number
All areas 0800 912 29 99

LinesearchbeforeUdig:

If you have an enquiry relating to the use of the LinesearchbeforeUdig website please contact LinesearchbeforeUdig using the following information:

Telephone 0845 437 7365
Email enquiries@linesearchbeforeudig.co.uk
Website www.linesearchbeforeudig.co.uk



Warning: PDF designed for A4 colour print only with no page scaling



Contact Us

Mapping Enquiries:

All areas 02920 278 912

General Enquiries:

All areas 0800 912 2999

Dig Sites

Area:

Line:

- Low Pressure (LP) 21mbar – 75mbar
- Medium Pressure (MP) 350mbar – 2bar
- Intermediate Pressure (IP) 2bar – 7bar
- High Pressure (HP) >7bar



Change of Diameter



End Cap



Depth of cover



Line/Fire Valve



Governor Station

EXTREME CAUTION.
Major Accident Hazard Pipeline in Vicinity
****RISK OF DEATH OR SERIOUS INJURY****
Prior to excavation starting you must contact the plant protection team on 02920 278912

Date Requested: 24/11/2020
Job Reference: 20623938
Site Location: 272514 194937
Requested by: Sir Conveyancing Data Services
Your Scheme/Reference: 1630655

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WWU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with H5(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WWU dig team on 02920 27891

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

Scale: 1:2563 (When plotted at A4)

Crown Copyright © - Reproduced by permission of Ordnance Survey on behalf of HMSO. And database right 2020. All rights reserved. Ordnance Survey Licence number 0100044308.

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

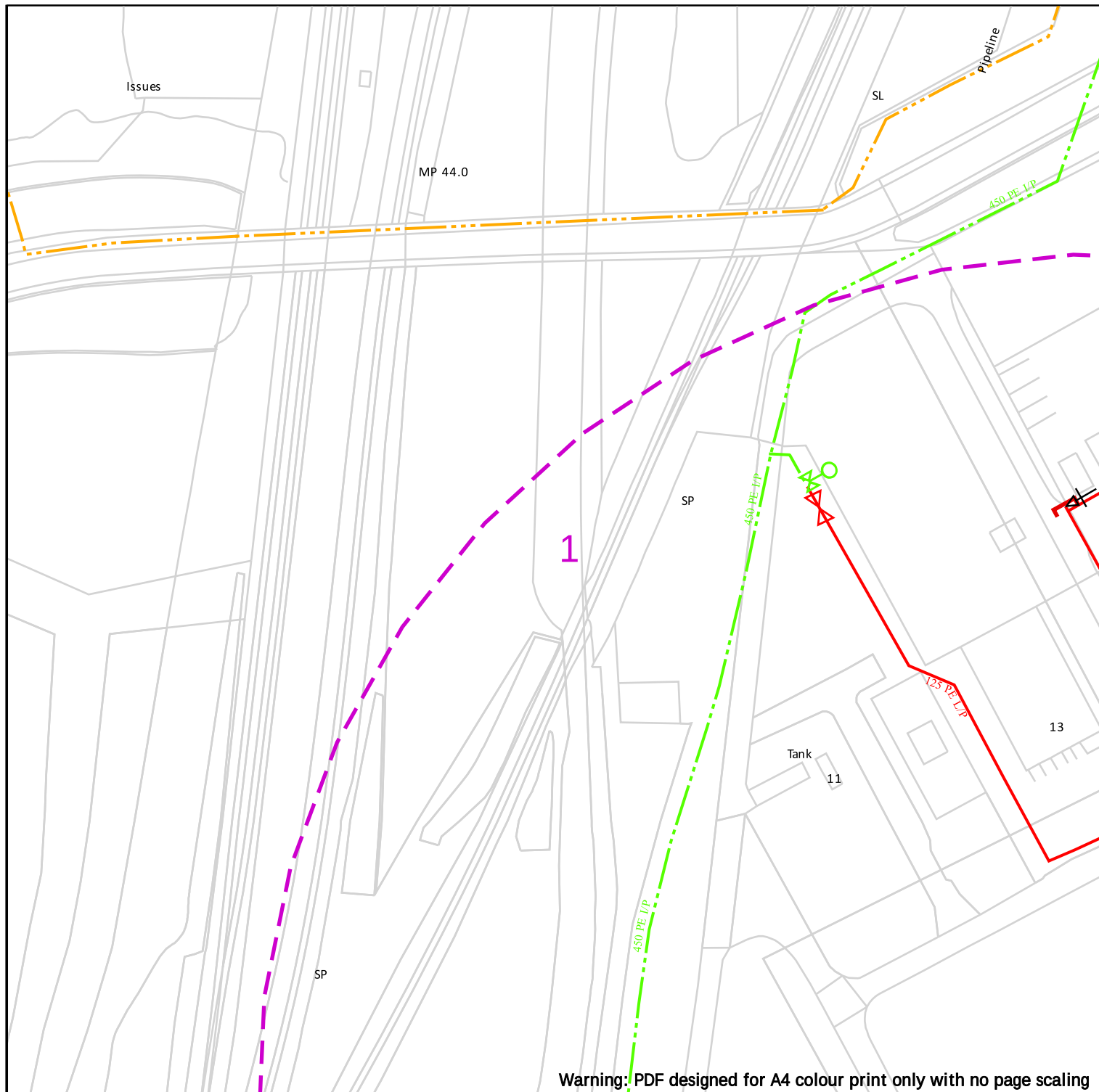
Dial
before
you dig

We need
10 days
notice

Dial
Call **029 2027 8912**
before you start work.

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.



Contact Us

Mapping Enquiries:

All areas 02920 278 912

General Enquiries:

All areas 0800 912 2999

Dig Sites

Area:

Line:

- Low Pressure (LP) 21mbar – 75mbar
- Medium Pressure (MP) 350mbar – 2bar
- Intermediate Pressure (IP) 2bar – 7bar
- High Pressure (HP) >7bar



Change of Diameter



End Cap



Depth of cover



Line/Fire Valve



Governor Station

EXTREME CAUTION.
Major Accident Hazard Pipeline in Vicinity
****RISK OF DEATH OR SERIOUS INJURY****
Prior to excavation starting you must contact the plant protection team on 02920 278912

Date Requested: 24/11/2020
Job Reference: 20623938
Site Location: 272514 194937
Requested by: Sir Conveyancing Data Services
Your Scheme/Reference: 1630655

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WUU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with H5(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WUU dig team on 02920 27891

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

Scale: 1:1250 (When plotted at A4)

Crown Copyright © - Reproduced by permission of Ordnance Survey on behalf of HMSO. And database right 2020. All rights reserved. Ordnance Survey Licence number 0100044308.

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

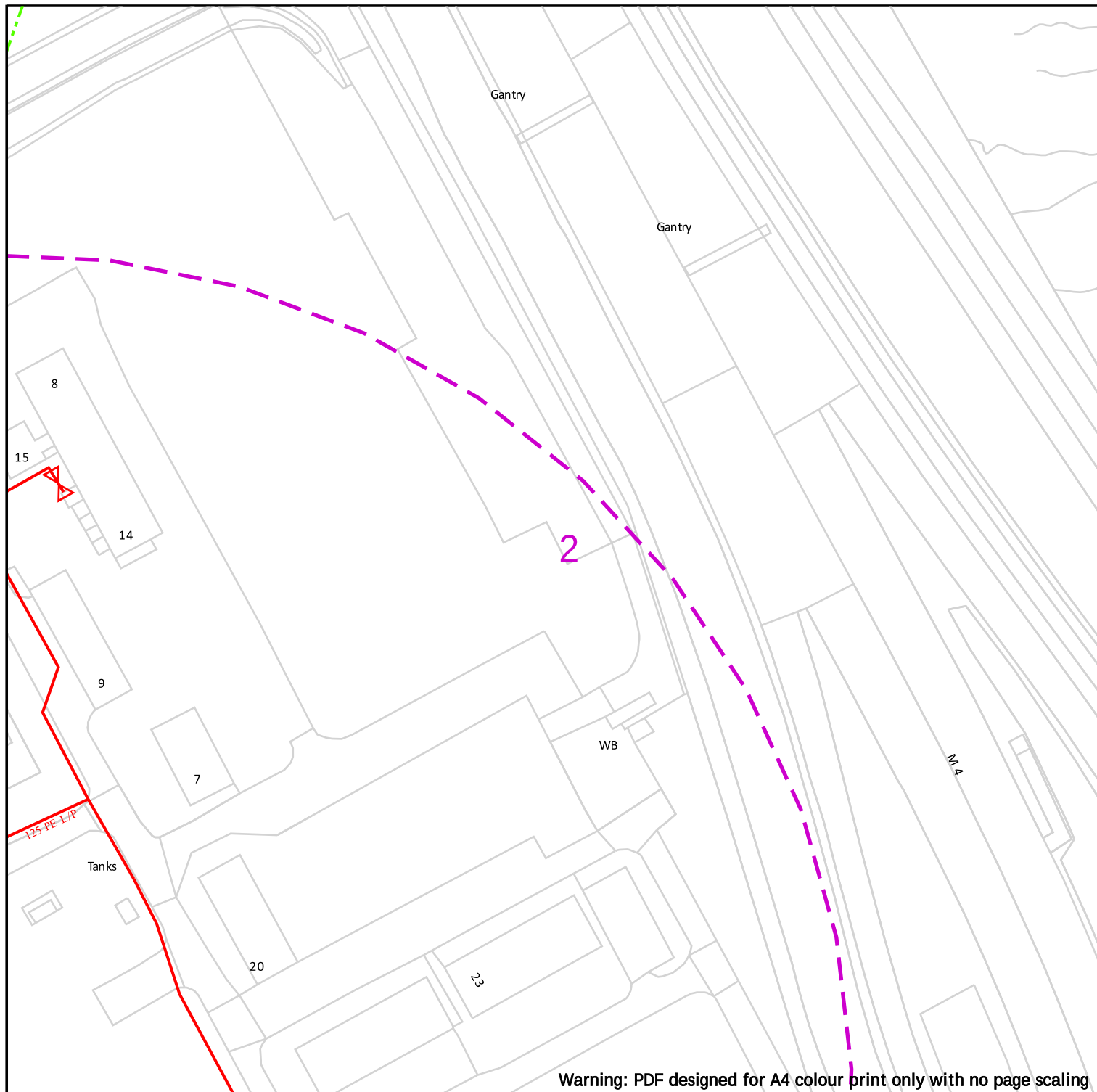
Dial
before
you dig

We need
10 days'
notice

Dial
Call **029 2027 8912**
before you start work.

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.



Warning: PDF designed for A4 colour print only with no page scaling



Contact Us

Mapping Enquiries:

All areas 02920 278 912

General Enquiries:

All areas 0800 912 2999

Dig Sites

Area:

Line:

- Low Pressure (LP) 21mbar – 75mbar
- Medium Pressure (MP) 350mbar – 2bar
- Intermediate Pressure (IP) 2bar – 7bar
- High Pressure (HP) >7bar



Change of Diameter



End Cap



Depth of cover



Line/Fire Valve



Governor Station

EXTREME CAUTION.
Major Accident Hazard Pipeline in Vicinity
****RISK OF DEATH OR SERIOUS INJURY****
Prior to excavation starting you must contact the plant protection team on 02920 278912

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WWU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with HS(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WWU dig team on 02920 27891

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

Date Requested: 24/11/2020
Job Reference: 20623938
Site Location: 272514 194937
Requested by: Sir Conveyancing Data Services
Your Scheme/Reference: 1630655

Scale: 1:1250 (When plotted at A4)

Crown Copyright © - Reproduced by permission of Ordnance Survey on behalf of HMSO. And database right 2020. All rights reserved. Ordnance Survey Licence number 0100044308.

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

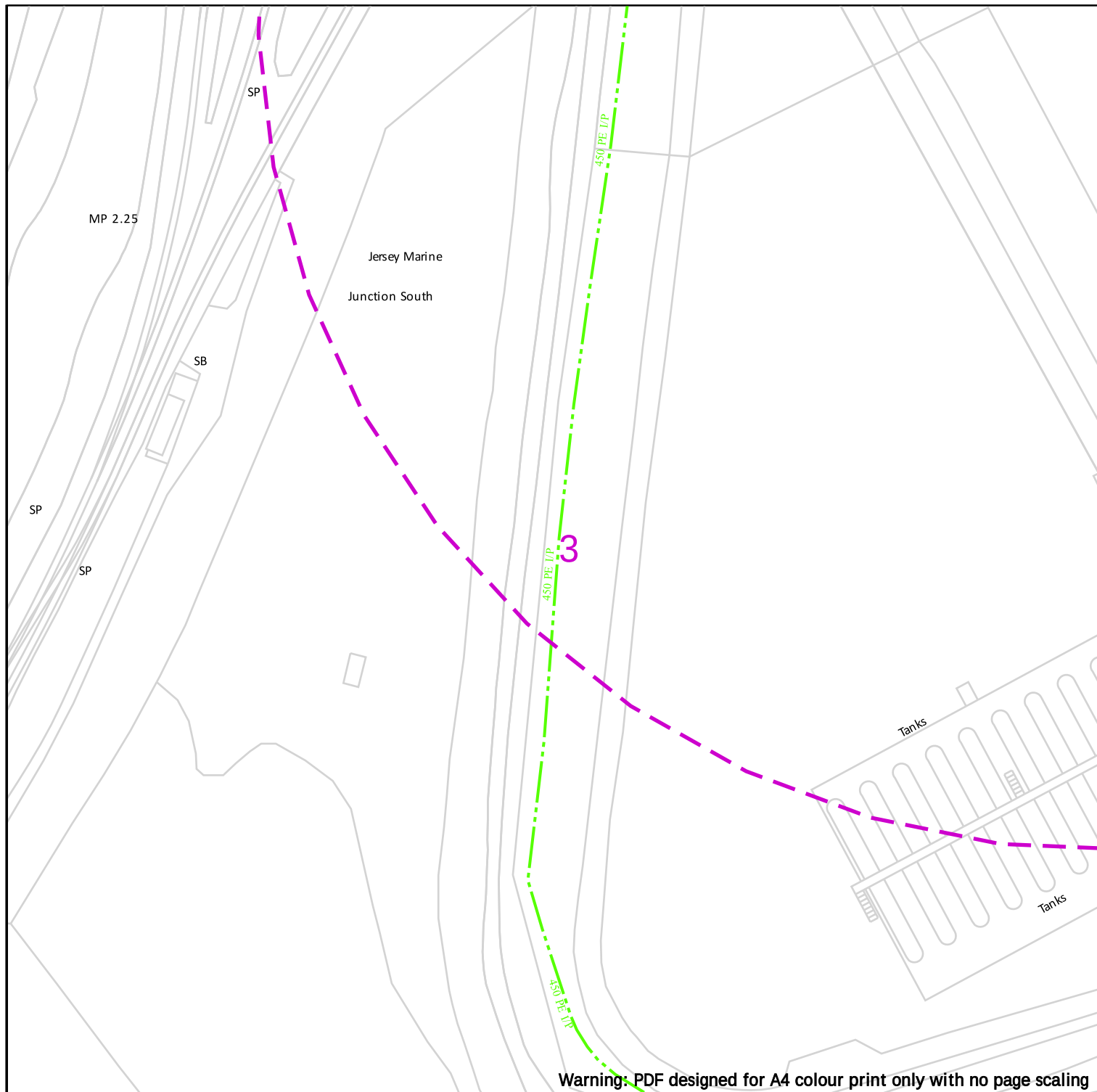
Dial
before
you dig

We need
10 days'
notice

Dial
Call **029 2027 8912**
before you start work.

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.



Contact Us

Mapping Enquiries:

All areas 02920 278 912

General Enquiries:

All areas 0800 912 2999

Dig Sites

Area:

Line:

- Low Pressure (LP) 21mbar – 75mbar
- Medium Pressure (MP) 350mbar – 2bar
- Intermediate Pressure (IP) 2bar – 7bar
- High Pressure (HP) >7bar



Change of Diameter



End Cap



Depth of cover



Line/Fire Valve



Governor Station

EXTREME CAUTION.
Major Accident Hazard Pipeline in Vicinity
****RISK OF DEATH OR SERIOUS INJURY****
Prior to excavation starting you must contact the plant protection team on 02920 278912

Date Requested: 24/11/2020
Job Reference: 20623938
Site Location: 272514 194937
Requested by: Sir Conveyancing Data Services
Your Scheme/Reference: 1630655

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WWU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with H5(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WWU dig team on 02920 27891

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

Scale: 1:1250 (When plotted at A4)

Crown Copyright © - Reproduced by permission of Ordnance Survey on behalf of HMSO. And database right 2020. All rights reserved. Ordnance Survey Licence number 0100044308.

Dial
before
you dig

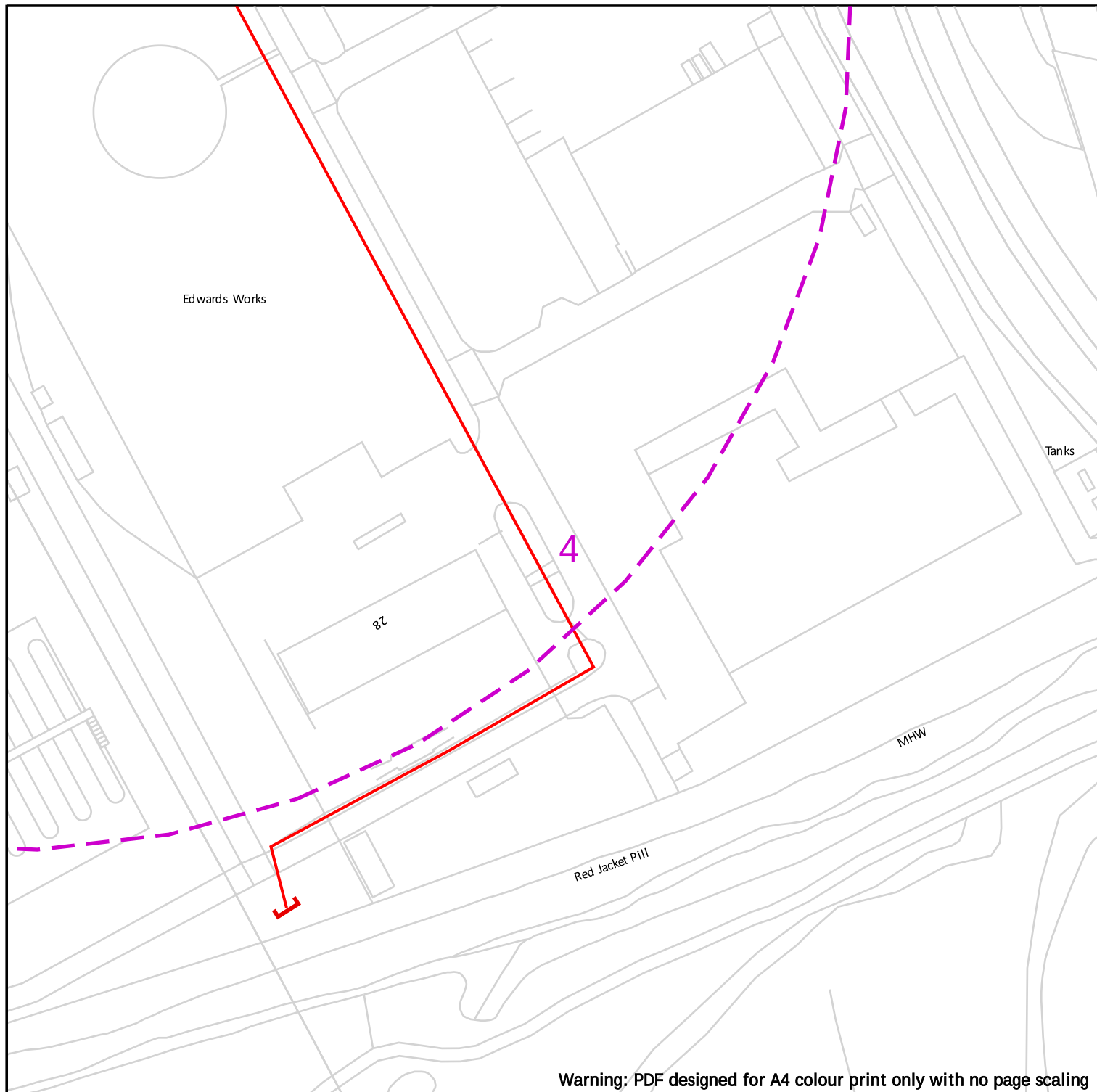
We need
10 days'
notice

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

Dial
Call **029 2027 8912**
before you start work.

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.



Warning: PDF designed for A4 colour print only with no page scaling



Contact Us

Mapping Enquiries:

All areas 02920 278 912

General Enquiries:

All areas 0800 912 2999

Dig Sites

Area:

Line:

- Low Pressure (LP) 21mbar – 75mbar
- Medium Pressure (MP) 350mbar – 2bar
- Intermediate Pressure (IP) 2bar – 7bar
- High Pressure (HP) >7bar



Change of Diameter



End Cap



Depth of cover



Line/Fire Valve



Governor Station

EXTREME CAUTION.
Major Accident Hazard Pipeline in Vicinity
****RISK OF DEATH OR SERIOUS INJURY****
Prior to excavation starting you must contact the plant protection team on 02920 278912

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WWU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with HS(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WWU dig team on 02920 27891

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

Date Requested: 24/11/2020

Job Reference: 20623938

Site Location: 272514 194937

Requested by: Sir Conveyancing Data Services

Your Scheme/Reference: 1630655

Scale: 1:1250 (When plotted at A4)

Crown Copyright © - Reproduced by permission of Ordnance Survey on behalf of HMSO. And database right 2020. All rights reserved. Ordnance Survey Licence number 0100044308.

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

Dial
before
you dig

We need
10 days'
notice

Dial
Call **029 2027 8912**
before you start work.

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.

Our Ref: 21052701 Your Ref: 2244011 - Former LP Gas Premises

Tuesday, 19 January 2021

Christopher Kitson
91 Albert Road
Widnes
Cheshire
WA8 6JS

Western Power Distribution,
Mapping Centre
Toll End Road
Tipton
West Midlands
United Kingdom
DY4 0HH
www.westernpower.co.uk

Dear Christopher Kitson

Thank you for your enquiry dated Tuesday, 19 January 2021

I now enclose a copy of our plan showing existing Western Power Distribution (WPD) Electricity / WPD Surf Telecom apparatus in the vicinity of your proposed works. This information is given as a general guide only and its accuracy cannot be guaranteed. Please note that all WPD equipment on site should be assumed to be LIVE until WPD prove otherwise and provide you with confirmation to this effect in writing. Recent additions to our network, or service connections between the main cable and a building or street lamp may not be shown.

Map Response
T 0121 623 9780
WPDMapResponse
@westernpower.co.uk

LinesearchbeforeUdig
Help Desk 0845 437 7365

Damage to underground cables and contact with overhead lines can cause severe injury or may prove fatal. If you are excavating on site in the vicinity of either WPD Electrical apparatus or WPD Surf Telecom apparatus you must comply with the requirements of the following:-

Health & Safety Executive guidance HS(G)47, Avoiding Danger from underground services.

Work taking place in the vicinity of our plant is also regulated under the:-

Electricity at Work Regulations 1989, Health and Safety Act 1974, CDM Regulations 2015.

Safe working procedures should be defined and practiced

Please ensure that the use of mechanical excavators in the vicinity of our plant is kept to a minimum. WPD Surf Telecom ducts contain fibre cables, which are expensive to repair. Therefore, extreme care must be taken whilst working in the vicinity of these ducts, hand digging methods being used to determine their precise position.

If there are overhead lines crossing your site and your proposal involves building works which may infringe the clearance to our overhead system then you should call the relevant general enquiries number (see page 2 of this letter) for advice. Where overhead lines cross your site you must comply with the requirements of Health & Safety Executive guidance as laid down in GS6, Avoidance of Danger from Overhead Electric Lines.

Western Power Distribution PLC
South West - 02366894
South Wales - 02366985
East Midlands - 02366923
West Midlands - 03600574

Where diversions to WPD apparatus are needed to allow change to occur on site, the cost of these alterations may be charged to the persons responsible for the works.

If you require advice in connection with your proposals please contact the relevant general enquiries number (see page 2 of this letter)

Registered in
England and Wales

Following consultation the local Western Power Distribution team will where necessary prepare detailed proposals and provide a quotation for any necessary alterations and/or development of our equipment on the site.

Registered Office:
Avonbank
Feeder Road
Bristol
BS2 0TB

Yours sincerely
WPD Map Response Team

Contact Us

Emergency or Power Supply issues

In an emergency call 105, 24 hours a day.

Mapping Enquiries

If you have an enquiry relating to this letter or the attached map plan, please contact us using the following information:

Telephone 0121 623 9780
Email WPDMapResponse@westernpower.co.uk

General Enquiries

If you have a general enquiry, please call us on the following telephone number:

All areas 0800 096 3080

LinesearchbeforeUdig

If you have an enquiry relating to the use of the LinesearchbeforeUdig website please contact LinesearchbeforeUdig using the following information:

Telephone 0845 437 7365
Email enquiries@linesearchbeforeudig.co.uk
Website www.linesearchbeforeudig.co.uk

Steps to help keep you safe

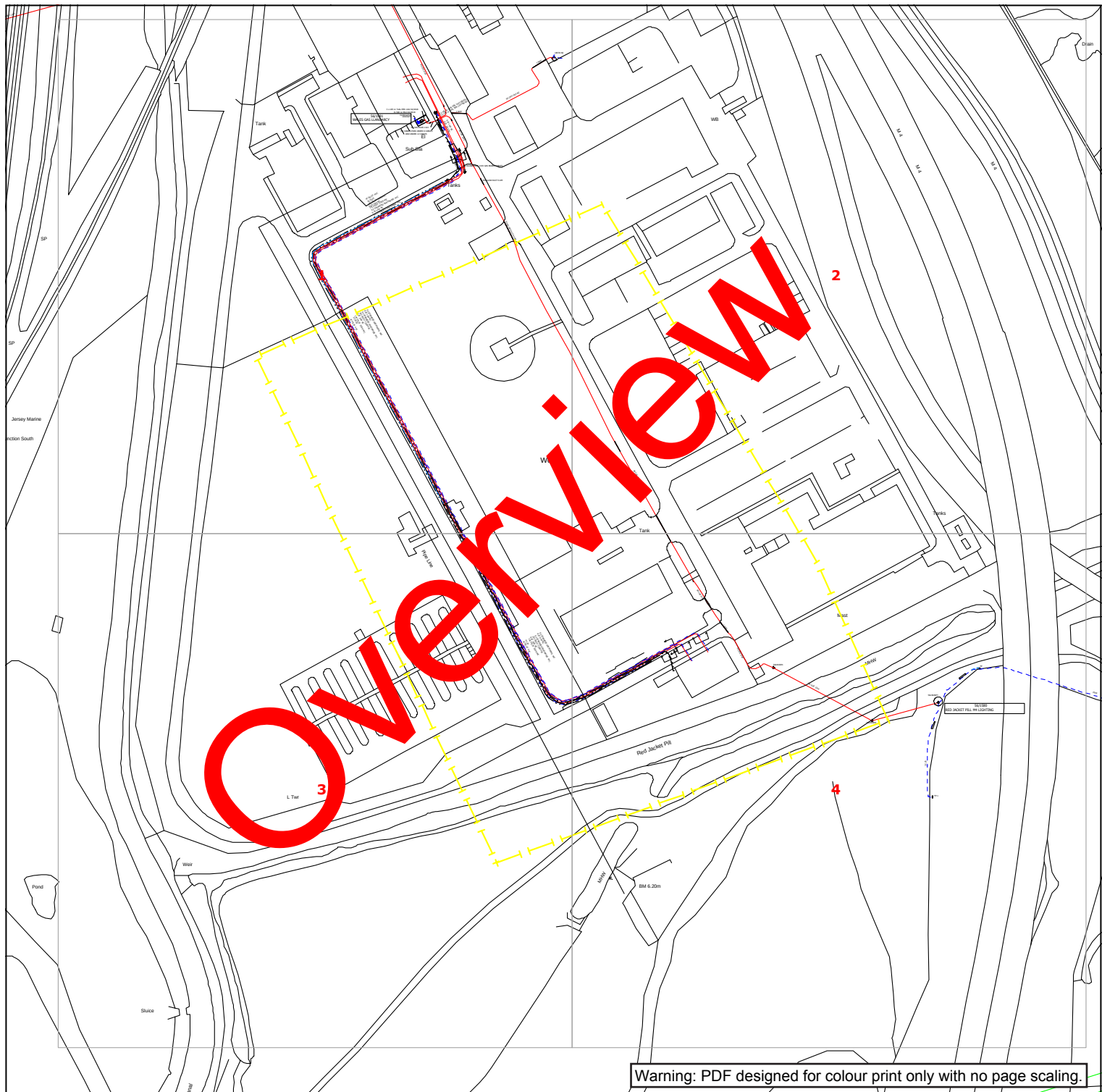
- **If you are working within 10 metres of our 33kV, 66kV, 132kV underground electricity cables or within 10 metres of an overhead electricity line you should call the relevant General Enquiries for free safety advice.**

Safety Documents – please download our informative safety documents to help ensure that you, your staff and the public are kept safe whilst working in the vicinity of electricity.

<https://www.westernpower.co.uk/customers-and-community/health-safety/public-safety-advice>

- **Make sure you have up to date plans** - remember that recent additions to our network or service connections between the main cable and a building or street lamp may not be shown.
- **Look for signs of service cables** - an electricity meter box or nearby streetlamp may give you an indication that service cables are present in your area of work.
- **Non WPD Network** - electricity cables, lines and equipment owned by others may also be present in addition to WPD network. They are unlikely to be shown on our plans.
- **Use a cable locator** - trace electricity cables and mark the position of them using paint or other waterproof marking on the ground.
- **Hand dig trial holes** - to confirm the position of cables in close proximity to your area of your work and use spades and shovels rather than picks, pins or forks.
- **Have an emergency plan** - so that everyone working on site understands what to do in the event of an underground electricity cable being damaged or contact being made with an overhead electricity line.
- **If you are working within 10 metres** of an overhead electricity line then it may be necessary for you to erect warning signs and markers, or height restriction goal posts. Ensure that you comply with the requirements of Health & Safety Executive guidance laid down in GS6, Avoidance of Danger from Overhead Electric Lines.
- **If you are erecting a structure** that could allow anyone standing on it, or its access device (ladder, scaffold, MEWP), to come within 3m of any overhead electric line then **you must inform us**. This is your duty and a legal requirement under the Electricity Safety, Quality & Continuity Regulations 2002.
- **If you cannot work safely** around the underground electricity cable or overhead electricity line, then you may need to get it moved to allow your works to go ahead. Call the general enquiry numbers above for guidance.
- **It is possible that cables or pipes may be embedded in concrete** - electricity cables embedded in concrete MUST be made 'dead' by Western Power Distribution or the cable owner before the concrete is broken out. Alternatively, another safe way of working should be agreed.

Cables are sometimes covered by tiles or a marker tape - these can be concrete, polythene or earthenware and are a useful early warning of the presence of cables; you should avoid disturbing any tiles or tape to expose the cable. Not all cables have these warning indicators.



WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Contact Us
Mapping Enquiries:
All areas 0121 623 9780
General Enquiries:
All areas 0800 096 3080

Date Requested: 19/01/2021
Job Reference: 21052701
Site Location: 272581 194827
Requested by:
Mr Christopher Kitson
Your Scheme/Reference:
2244011 - Former LP Gas P
remises

Link Box
●
Site Location
Line/Area
| |

Overhead Line
○ PL
○ Service
○ LV
○ HV (11kV)
○ HV (33kV)
○ HV (66kV)
⊠ HV (132kV)

Underground Cable
— PL
— Service
— LV
— HV (11kV)
— HV (33kV)
— HV (66kV)
— HV (132kV)

SURF Telecoms
— S — S —
PME Earth
Underground Earth

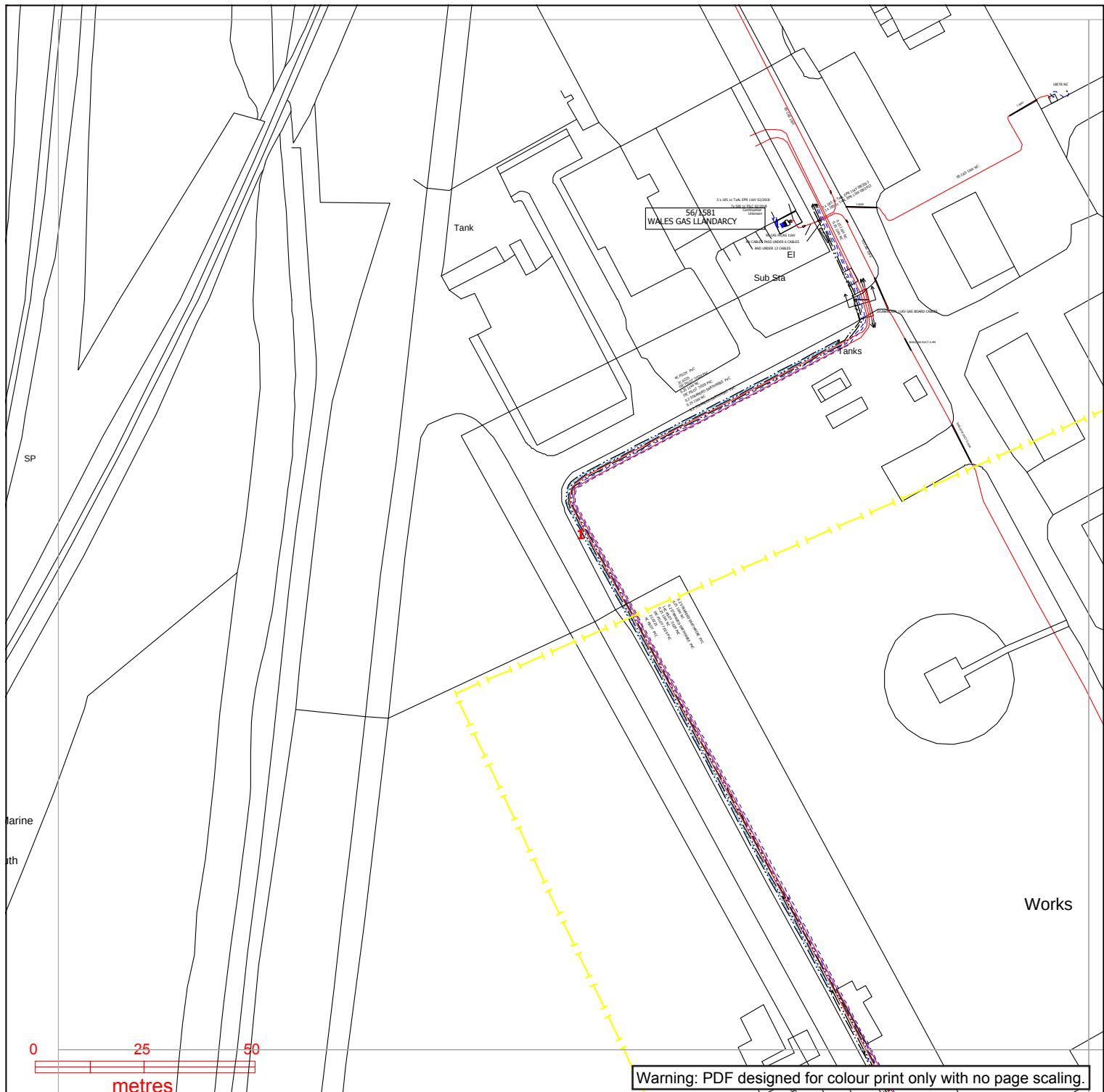
Pilot Cables
— P — P —
Pole Mounted Transformer
Ground Mounted Transformer

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our General Enquiries number.
- Advice should be sought from the Western Power Distribution General Enquiries team for any work that is to take place in proximity to 132kV underground cables and 132kV overhead lines.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 6783 105

Crown Copyright © All Rights Reserved. Ordnance Survey Licence numbers: 100022488, 100024877 & 100021807.
WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner



WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Contact Us

Mapping Enquiries:

All areas 0121 623 9780

General Enquiries:

All areas 0800 096 3080

Date Requested: 19/01/2021

Job Reference: 21052701

Site Location: 272581 194827

Requested by:

Mr Christopher Kitson

Your Scheme/Reference:

2244011 - Former LP Gas P
remises

Exact Scales:

1:1250 Area or Circle dig site

1:500 Line dig site

Link Box



Site Location

Line/Area



Overhead Line

	PL
	Service
	LV
	HV (11kV)
	HV (33kV)
	HV (66kV)
	HV (132kV)

Underground Cable

	PL
	Service
	LV
	HV (11kV)
	HV (33kV)
	HV (66kV)
	HV (132kV)

SURF Telecoms

	PME Earth
	Underground Earth

Pilot Cables

	Pole Mounted Transformer
	Ground Mounted Transformer

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our General Enquiries number.
- Advice should be sought from the Western Power Distribution General Enquiries team for any work that is to take place in proximity to 132kV underground cables and 132kV overhead lines.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 6783 105

Crown Copyright © All Rights Reserved. Ordnance Survey Licence numbers: 100022488, 100024877 & 100021807.
WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner



WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Contact Us
Mapping Enquiries:
All areas 0121 623 9780
General Enquiries:
All areas 0800 096 3080

Date Requested: 19/01/2021
Job Reference: 21052701
Site Location: 272581 194827
Requested by:
Mr Christopher Kitson
Your Scheme/Reference:
2244011 - Former LP Gas P
remises

Exact Scales:
1:1250 Area or Circle dig site
1:500 Line dig site

Link Box
●
Site Location
Line/Area
| |

Overhead Line
—○— PL
—○— Service
—○— LV
—○— HV (11kV)
—○— HV (33kV)
—○— HV (66kV)
—X— HV (132kV)

Underground Cable
— — — — —
— — — — —
— — — — —
— — — — —
— — — — —

SURF Telecoms
—S—S—
PME Earth
—E—
Underground Earth

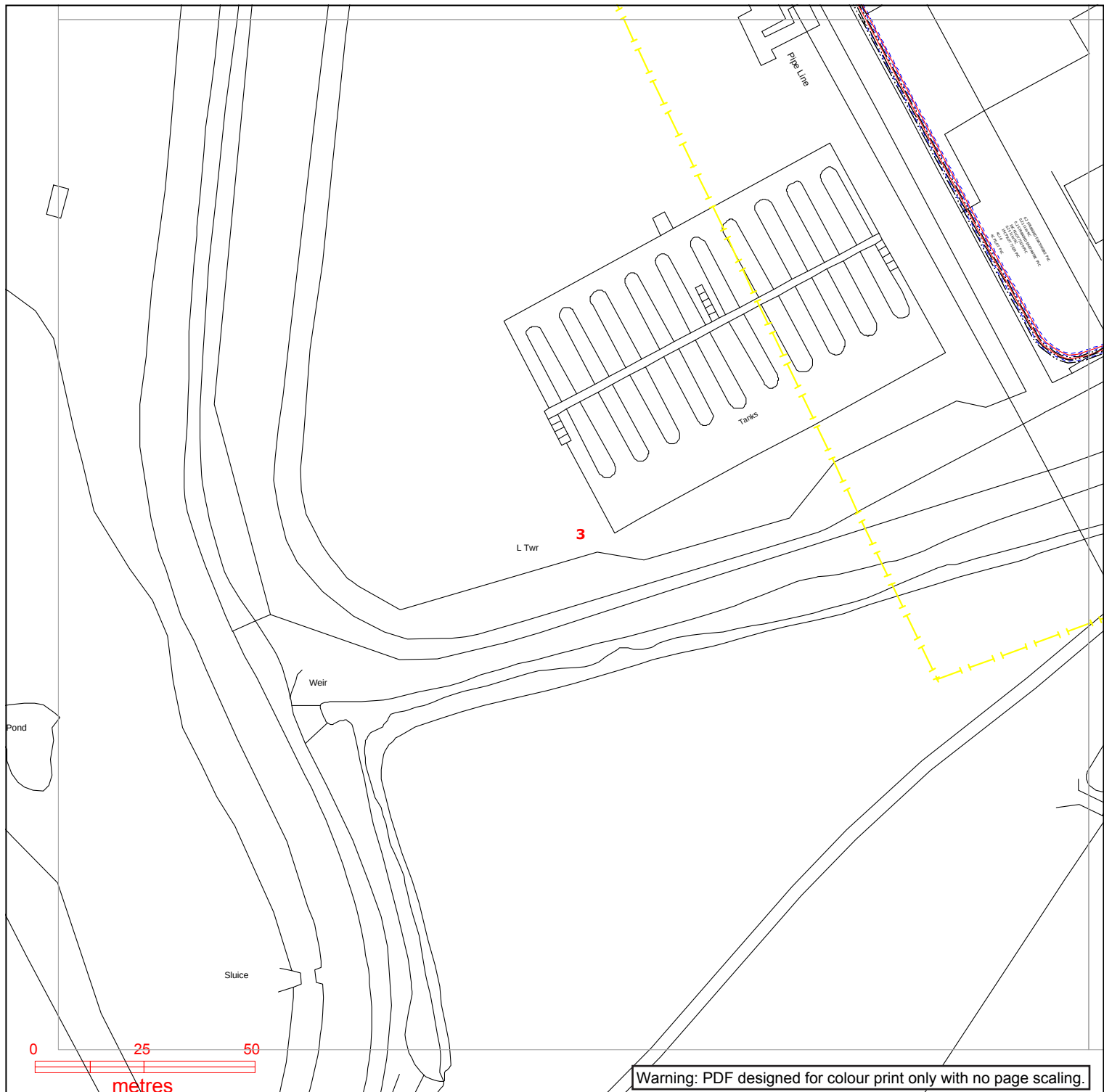
Pilot Cables
—P—P—
Pole Mounted Transformer
Ground Mounted Transformer

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our General Enquiries number.
- Advice should be sought from the Western Power Distribution General Enquiries team for any work that is to take place in proximity to 132kV underground cables and 132kV overhead lines.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 6783 105

Crown Copyright © All Rights Reserved. Ordnance Survey Licence numbers: 100022488, 100024877 & 100021807.
WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner

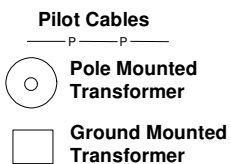
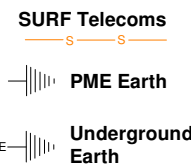
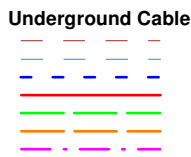
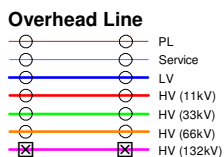


WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Contact Us
Mapping Enquiries:
All areas 0121 623 9780
General Enquiries:
All areas 0800 096 3080

Date Requested: 19/01/2021
Job Reference: 21052701
Site Location: 272581 194827
Requested by:
Mr Christopher Kitson
Your Scheme/Reference:
2244011 - Former LP Gas P
remises

Exact Scales:
1:1250 Area or Circle dig site
1:500 Line dig site

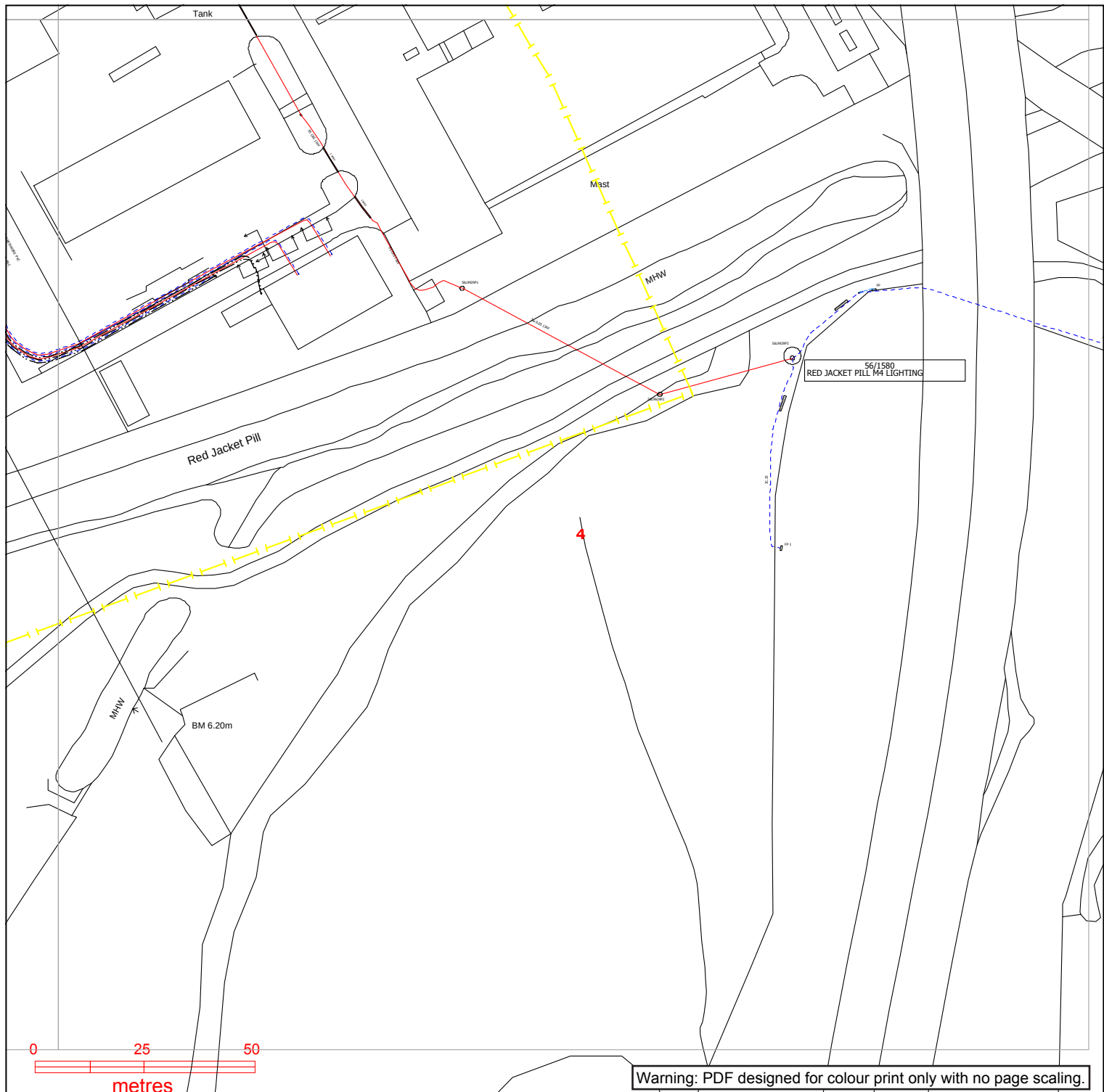


IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our General Enquiries number.
- Advice should be sought from the Western Power Distribution General Enquiries team for any work that is to take place in proximity to 132kV underground cables and 132kV overhead lines.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 6783 105

Crown Copyright © All Rights Reserved. Ordnance Survey Licence numbers: 100022488, 100024877 & 100021807.
WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner



WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Contact Us

Mapping Enquiries:

All areas 0121 623 9780

General Enquiries:

All areas 0800 096 3080

Date Requested: 19/01/2021

Job Reference: 21052701

Site Location: 272581 194827

Requested by:

Mr Christopher Kitson

Your Scheme/Reference:

2244011 - Former LP Gas P
remises

Exact Scales:

1:1250 Area or Circle dig site

1:500 Line dig site

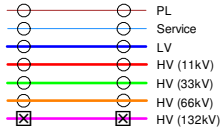
Link Box



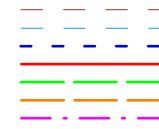
**Site Location
Line/Area**



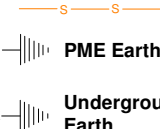
Overhead Line



Underground Cable



SURF Telecoms



Pilot Cables



**Pole Mounted
Transformer**



IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our General Enquiries number.
- Advice should be sought from the Western Power Distribution General Enquiries team for any work that is to take place in proximity to 132kV underground cables and 132kV overhead lines.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 6783 105

Crown Copyright © All Rights Reserved. Ordnance Survey Licence numbers: 100022488, 100024877 & 100021807.

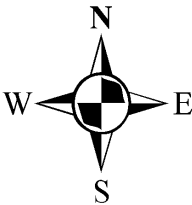
WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner

D Welsh Water Surface Water Sewer Maps



Dŵr Cymru
Welsh Water

Asphalt Plant Llandarcy



LEGEND(Representative of most common features)

Waste network:	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station
	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station
	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station
	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station
	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station	Foul chamber	Surface water chamber	Combined chamber	Combined sewer overflow	Special purpose chamber	Treatment works	Pumping station

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.

Reproduced by permission of the Ordnance Survey on behalf of
HMSO. © Crown copyright and database right 2017.
All rights reserved .
Ordnance Survey Licence number 100019534

Map Ref: 272588,194834
Map scale: 1:2500
Printed by: Emma John
Printed on: 06 May 2021

E Microdrainage Calculations

JBA Consulting		Page 1
The Old School House St. Joseph's Street Tadcaster LS24 9HA		
Date 03/06/2021 12:06 File LLANDARCY V0.5.MDX	Designed by jflownw Checked by	
Micro Drainage Network 2018.1.1		

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 272546 194865 SS 72546 94865	
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	48.000	0.400	120.0	1.200	5.00	0.0	0.600	\/	-1	Pipe/Conduit	
1.001	18.000	0.200	90.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.18	6.300	1.200	0.0	0.0	0.0	4.36	8623.0	162.5
1.001	50.00	5.30	5.900	1.200	0.0	0.0	0.0	2.57	726.0	162.5

©1982-2018 Innovyze

JBA Consulting		Page 2
The Old School House St. Joseph's Street Tadcaster LS24 9HA		
Date 03/06/2021 12:06 File LLANDARCY V0.5.MDX	Designed by jflownw Checked by	
Micro Drainage		Network 2018.1.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	7.200	0.900	Junction		1.000	6.300	-1				
2	7.200	1.300	Open Manhole	10000	1.001	5.900	600	1.000	5.900	-1	
	7.200	1.500	Open Manhole	0		OUTFALL		1.001	5.700	600	

JBA Consulting		Page 3
The Old School House St. Joseph's Street Tadcaster LS24 9HA		
Date 03/06/2021 12:06 File LLANDARCY V0.5.MDX		
Designed by jflownw Checked by		
Micro Drainage		Network 2018.1.1

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	\/	-1	1	7.200	6.300	0.000	Junction	
1.001	o	600	2	7.200	5.900	0.700	Open Manhole	10000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	48.000	120.0	2	7.200	5.900	0.400	Open Manhole	10000
1.001	18.000	90.0		7.200	5.700	0.900	Open Manhole	0

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001		7.200	5.700	0.000	0	0

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
15	6.860	75	6.860	135	6.860	195	6.860	255	6.860	315	6.860
30	6.860	90	6.860	150	6.860	210	6.860	270	6.860	330	6.860
45	6.860	105	6.860	165	6.860	225	6.860	285	6.860	345	6.860
60	6.860	120	6.860	180	6.860	240	6.860	300	6.860	360	6.860

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	20.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model FEH

JBA Consulting		Page 4																		
The Old School House St. Joseph's Street Tadcaster LS24 9HA																				
Date 03/06/2021 12:06 File LLANDARCY V0.5.MDX	Designed by jflownw Checked by																			
Micro Drainage		Network 2018.1.1																		
<u>Synthetic Rainfall Details</u> <table> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> </tr> <tr> <td>Site Location</td> <td>GB 272546 194865 SS 72546 94865</td> </tr> <tr> <td>Data Type</td> <td>Point</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> </tr> <tr> <td>Winter Storms</td> <td>No</td> </tr> <tr> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>Storm Duration (mins)</td> <td>30</td> </tr> </table>			Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 272546 194865 SS 72546 94865	Data Type	Point	Summer Storms	Yes	Winter Storms	No	Cv (Summer)	0.750	Cv (Winter)	0.840	Storm Duration (mins)	30
Return Period (years)	100																			
FEH Rainfall Version	2013																			
Site Location	GB 272546 194865 SS 72546 94865																			
Data Type	Point																			
Summer Storms	Yes																			
Winter Storms	No																			
Cv (Summer)	0.750																			
Cv (Winter)	0.840																			
Storm Duration (mins)	30																			
©1982-2018 Innovyze																				

JBA Consulting		Page 5							
The Old School House St. Joseph's Street Tadcaster LS24 9HA									
Date 03/06/2021 12:06	Designed by jflownw								
File LLANDARCY V0.5.MDX	Checked by								
Micro Drainage	Network 2018.1.1								
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow 20.000							
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage 2.000							
Hot Start Level (mm)	0	Inlet Coefficient 0.800							
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day) 0.000							
Foul Sewage per hectare (l/s)	0.000								
Number of Input Hydrographs	0	Number of Storage Structures 0							
Number of Online Controls	0	Number of Time/Area Diagrams 0							
Number of Offline Controls	0	Number of Real Time Controls 0							
Synthetic Rainfall Details									
Rainfall Model	FEH								
FEH Rainfall Version	2013								
Site Location	GB 272546 194865 SS 72546 94865								
Data Type	Point								
Cv (Summer)	0.750								
Cv (Winter)	0.840								
Margin for Flood Risk Warning (mm)	300.0								
Analysis Timestep	2.5 Second Increment (Extended)								
DTS Status	OFF								
DVD Status	ON								
Inertia Status	ON								
Profile(s)	Summer and Winter								
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440								
Return Period(s) (years)	30, 100								
Climate Change (%)	0, 0								
PN	US/MH Name Storm	Return Period Climate Change First (X) Surge First (Y) Flood First (Z) Overflow Overflow Act.							
1.000	1 360 Summer	30 +0% 100/60 Winter							
1.001	2 360 Winter	30 +0% 30/30 Summer							
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	7.200	0.000	0.000	0.02		91.6	FLOOD RISK*	
1.001	2	7.012	0.512	0.000	0.54		242.2	FLOOD RISK	
©1982-2018 Innovyze									

JBA Consulting		Page 6						
The Old School House St. Joseph's Street Tadcaster LS24 9HA								
Date 03/06/2021 12:06								
File LLANDARCY V0.5.MDX								
Designed by jflownw								
Checked by								
Micro Drainage		Network 2018.1.1						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
Simulation Criteria								
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 20.000						
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000						
Hot Start Level (mm) 0		Inlet Coefficient 0.800						
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000						
Foul Sewage per hectare (l/s) 0.000								
Number of Input Hydrographs 0		Number of Storage Structures 0						
Number of Online Controls 0		Number of Time/Area Diagrams 0						
Number of Offline Controls 0		Number of Real Time Controls 0						
Synthetic Rainfall Details								
Rainfall Model		FEH						
FEH Rainfall Version		2013						
Site Location		GB 272546 194865 SS 72546 94865						
Data Type		Point						
Cv (Summer)		0.750						
Cv (Winter)		0.840						
Margin for Flood Risk Warning (mm)		300.0						
Analysis Timestep 2.5 Second Increment (Extended)								
DTS Status		OFF						
DVD Status		ON						
Inertia Status		ON						
Profile(s)		Summer and Winter						
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440								
Return Period(s) (years)		30, 100						
Climate Change (%)		0, 0						
US/MH Return Climate First (X) First (Y) First (Z) Overflow								
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.
1.000	1	480 Winter	100	+0%		100/60 Winter		
1.001	2	480 Winter	100	+0%	30/30 Summer			

F Designers Risk Assessment

Design Risk Assessment

Document control: 2021s0564 Llandarcy Outline Surface Water Drainage Strategy

Contributing designers	Revision	Purpose of issue	Checked	Reviewed	Date
Clare Burnell	P01	Planning	Clare Burnell	Luke Virgo	20/05/2021

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform	Stage 4 Control		
Ref. no.	Project element, material or activity	Key health and safety <u>hazards</u> and their possible effects	<u>People</u> at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Design								
Des1	Design of drainage (All sites)	Services: potential for a large number of underground services crossing the site - gas, electricity, process drains and surface water drains Risk of striking services.	- Site personnel. - Existing infrastructure	Hazard cannot be eliminated by design. High level gas and electricity searched have already taken place at the site providing an estimate of the utility location. The exact locations of these utilities and others in the area should be identified and mapped.	Potential unidentified services	DRA	Designer at detailed stage (identifying known risks) Contractor (construction of the scheme)	Detailed survey of services prior to construction. Liaison with utility providers. Risk assessments and method statements and adequate briefing of site personnel.
Des2	Design of drainage (All sites)	Ground and groundwater conditions: No groundwater envisaged to be encountered Site is and was used for heavy industry so the ground is likely to be contaminated. Potential for: Instability Groundwater in excavations	Site personnel Site plant	Hazard cannot be eliminated by design. Preliminary drainage design assumes largely shallow drainage / SuDS features It has been proposed that the site should be capped to prevent mobilisation of contaminants. This includes replacing 600mm of top soil in landscaped areas.	Unknown ground conditions remain	DRA	Designer (identifying known risks) Contractor (construction of the scheme)	Follow recommendations arising from ground investigation report.
Des3	Design of drainage (All sites)	Unexploded ordnance	Site personnel Site plant Public	Any unexploded ordnance map has been consulted at zeticauxo.com This has highlighted that there is a low risk of finding UXO across the proposed development site	Low risk from UXO	DRA	Designer (identifying known risks) Contractor (construction of the scheme)	Risk assessments and method statements and adequate briefing of site personnel.

Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key health and safety <u>hazards</u> and their possible effects	<u>People</u> at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Des4	Design of above ground SuDS features	Risk of trips, falls and drowning	End user	Preliminary design undertaken in accordance with CIRIA C753. Proposals to provide planting to demarcate SuDS features whilst not obscuring visibility. Due to the depth and steeper than usual side slopes of the wet swale/ wetland, further consideration of measures to ensure safety of these features will be required during the detailed design stage.	Lack of knowledge about the SuDS features. Disrepair/lack of maintenance causing instability or obscured visibility	DRA	Owner/operator/ scheme designer	Detailed design should consider the use of appropriate planting and other mitigation measures around the wet swale/ wetland to reduce the risk of people entering the SuDS assets. Passive surveillance on all above ground SuDS features is good due to the open nature of the site. Side slopes on the wet swale/ wetland is 1:2 and further consideration of measures to ensure safety of these features will be required during the detailed design stage. Maintenance schedule to be prepared.
Construction								
Con1	Excavations	Potential for instability of excavations Potential for groundwater flooding of excavations and contamination spread/mobilisation of contaminants Potential for striking of services/UXO	Site personnel Existing infrastructure Site plant	Hazard cannot be eliminated by design Limit depth of excavations where practicable. Capping to be undertaken by an appropriate contractor	Ground conditions and potential services	DRA	Contractor	Early involvement of temporary works designer recommended Risk assessments and method statements and adequate briefing of site personnel. Follow recommendations arising from ground investigation report. Detailed survey of services prior to construction. Liaison with utility providers.

Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key health and safety hazards and their possible effects	People at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Significant residual hazards and risks	Communication method	Risk owner(s)	Proposed control measures
Con2	Plant/ material deliveries	Access via an unnamed road from the B4290 Unauthorised access by members of public Existing site operations – deliveries and shipments, and site manoeuvres Site traffic causing hazards to general public/ collisions	Site personnel Public	Hazard cannot be eliminated by design	Site access	DRA	Contractor	Traffic management plans, consultations with stakeholders, traffic management design and relevant NRSWA applications. Consider access to sites and expected levels of traffic, road widths, parking arrangements etc. Limit volumes of imported material or muck away where possible. Risk assessments and method statements and adequate briefing of site personnel.
Operation & Maintenance								
O&M1	Drainage system in operation	Potential for failure of the drainage system and flooding of the site	End users Maintenance personnel	Design drainage to an appropriate design life and design storm event Consideration given appropriate arrangements for operation, maintenance and cleansing of features	Risk of flooding remains during exceedance events and if maintenance requirements are not followed.	Operation and maintenance manual (to be prepared)	Asset owner/operator	Regular maintenance in accordance with O&M manual, normal site safety controls, designated overland flow routes away from man factory and existing buildings

Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key health and safety <u>hazards</u> and their possible effects	<u>People</u> at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
O&M2	Maintenance of drainage system	Water Working at height Confined spaces Slips and trips	Maintenance personnel	Reduce or remove the need to enter confined spaces through the design of inspection chambers and access reducers where practicable. Above ground shallow SuDS features recommended where possible.	Water Working at height Slips and trips	Operation and maintenance manual (to be prepared)	Asset owner/operator	Non-person entry inspection chambers to be used, where possible, to eliminate confined space entry. Record non-entry methods of maintenance in O&M manual. Vegetation in wet swale/ wetland should be cut using a strimmer rather than a mower due to the 1:2 slope. Edge barriers to be used. Regular maintenance in accordance with O&M manual, normal site safety controls.
Demolition								
Dem1	Removal of drainage features requiring excavation	Hazards and risks: largely as per the construction stage, except that the removal of the drainage system will increase a risk of flooding to the site.	Site personnel End user	Replacement SuDS based drainage system to be provided.	Instability of excavations, disturbance of services Increase of flood risk	DRA	Demolition contractor	Full as-built records, specifications and maintenance procedures included in O&M manual to aid in planning of demolition

Design Risk Assessment

Environmental Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key environmental <u>hazards</u> and their possible effects	Who or what is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Guidance	Consider all aspects involved in each stage of interface with the site, environment and structure(s).	Record the key hazards and their potential consequences.	Identify the categories of people, animals or environments at risk.	Include obtaining adequate data for design certainty and any further studies carried out during the risk evaluation process. Proposed measures to be taken by constructors and operators are to be included in Stage 4.	Provide details of residual hazards and risks that will need to be communicated and managed.	Record how information is provided, whether on drawings, pre-construction information, buildability statement, specification, reports or H&S File	Record the name of designers, contractors, the client or other stakeholders who are to ensure the significant residual risk is minimised and controlled.	Recommend measures to be taken by the risk owner(s) to minimise and control the significant residual risk.
Design								
EDes1	Design of drainage system	Potential for ground contamination, Risk of pollution	Groundwater / surface water bodies	Site to be capped to prevent contamination of surface water	N/A	DRA	Contractor	Site to be capped in order to mitigate risk of mobilisation of contaminants.
EDes2	Design of drainage system	Oil spillage Pollution	Groundwater/ surface water bodies	SUDS including filter strips and wet swales/ wetland have been used to treat flows in addition to a Class 1 full retention separator. The Simple Index Approach has been utilised to demonstrate that the proposed SuDS features provide sufficient treatment to ensure there is no detrimental effect to water quality. Therefore, the SUDS measures are considered sufficient to control pollution within the development. However, further consultations are needed with NRW to establish whether a discharge consent or further treatment stages are required.	Lack of maintenance of SUDS features and separator may mean pollution events bypass the SUDS features and pollute groundwater and/or the Red Jacket Pill.	O&M manual	Asset owner/operator	Regular maintenance in accordance with O&M manual.
Construction								
ECon1	Construction of drainage system	Pollution of watercourses/drainage systems during construction, with sediments, oils and chemicals	Water bodies	Hazard cannot be eliminated by design.	Pollution	Construction Management Plan (to be prepared)	Contractor	Risk assessment and method statement undertaken to avoid pollution during the works. Water from excavations not to be connected to the drainage system. Use of silt curtains, bunded storage tanks, spill kits envisaged.

Design Risk Assessment

Environmental Considerations

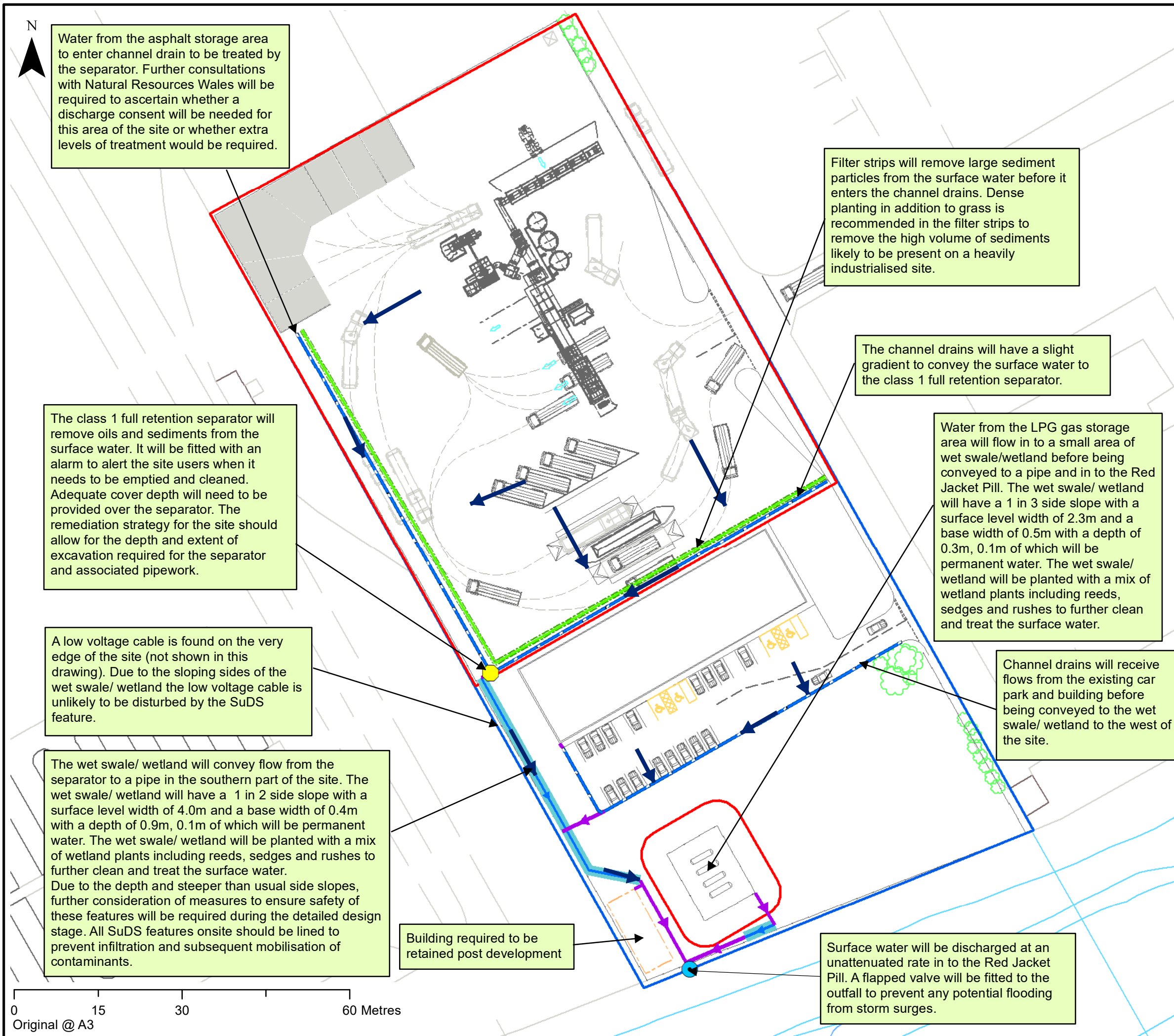
Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key environmental <u>hazards</u> and their possible effects	<u>Who or what</u> is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Operation & Maintenance								
O&M1	Inspection and clearance of manholes, filter strips and wet swales/ basins	Oil/fuel, sediment Pollution	Environment Maintenance personnel	Hazard cannot be eliminated by design.	Pollution	Operation and maintenance manual (to be prepared)	Asset owner/operator	Regular maintenance in accordance with O&M manual, normal site safety controls. Materials/sediments removed to be treated as contaminated and disposed of to a licenced waste management facility
O&M1	Inspection and clearance of Class 1 full retention separator	Oil/fuel, sediment Pollution	End users	Hazard cannot be eliminated by design.	Pollution	Operation and maintenance manual (to be prepared)	Asset owner/operator	Regular maintenance in accordance with O&M manual, normal site safety controls. Clearance to be undertaken if the alarm triggers to indicate that the separator needs to be emptied and cleaned. Materials/sediments removed to be treated as contaminated and disposed of to a licenced waste management facility.

Design Risk Assessment

Environmental Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material or activity	Key environmental <u>hazards</u> and their possible effects	<u>Who or what</u> is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Demolition								
Dem1	Removal of the drainage system/ general demolition activities	Hazards and risks: largely as per the construction stage, except that the removal of the drainage system will increase a risk of pollution to the water environment.	Water bodies, groundwater	Replacement SuDS based drainage system to be provided.	Pollution	Operation and Maintenance manual	Demolition contractor	Full as-built records, specifications and maintenance procedures included in O&M manual to aid in planning of demolition Risk assessment and method statement undertaken to avoid pollution during the works. Water from excavations not to be connected to the drainage system. Use of silt curtains, bunded storage tanks, spill kits envisaged.

G Outline Surface Water Drainage Strategy



KEYPLAN



KEY

- Flow Direction
- Outfall
- Oil / Silt Separator
- Filter Strip
- Channel Drain
- Pipe
- Wet Swale/ Wetland
- Developable area
- Whole Site

Contains OS data © Crown copyright and database right 2021



LLANDARCY OUTLINE DRAINAGE STRATEGY

Gerald D Harries & Sons Ltd

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:  

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

