

South Wales Trunk Road Agent

Managing and Improving
Motorways and Trunk Roads
through South Wales



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Cymru

M48 Central Reserve Safety Barrier Review

Operational Risk Assessment

March 2022



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Llywodraeth Cymru
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M48 Central Reserve Safety Barrier Review

Operational Risk Assessment

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1 Introduction

The central reserve safety barrier along the M48 has been identified as unserviceable. SWTRA has commissioned WSP to undertake an assessment of the risks associated with the central reserve road restraint systems (RRS) in the intervening time until a replacement system can be designed and installed. This report will assess the risks and consider options to mitigate those risks.

2 Relevant Standards

This report has been prepared with reference to the following standards:

- CD377 Requirement for Road Restraint Systems (DMRB 2.2.8)
- CD 127 Cross sections and Headrooms

3 Site Description

The M48 between Junction 23 with the M4 and Junction 2 opened circa 1966 as part of the M4 and was redesignated as the M48 in 1996 following the construction of the second Severn Crossing and the rerouting of the M4. It is a two-lane motorway with a hard shoulder, approximately 18km in overall length running on an east to west alignment.

The area relevant to this report is the 10.3km length between Junction 23 with the M4 and Junction 2 of the M48.

The M48 is lit in the vicinity of Junctions with street lighting located in the nearside verge and it is kerbed in the central reserve at some points and also kerbed on the nearside edge of carriageway at some points.

The surface run off drains into gullies or roadside channels along the kerbed edges of the carriageway.

4 Existing Situation

4.1 Road Restraint Systems

The arrangement of RRS within the central reserve on the M48 between the Bencroft Underpass at junction 23 with the M4 and the east side of junction 2 comprises a single line of double-sided corrugated beams with overlapping sections to protect road signage.

The entire length of the barriers is considered to be no longer serviceable.



At the intersection of the original M4 carriageway and the new M48 J23 interchange links; the double-sided barrier protects a traffic sign from EB traffic however a single box beam protects the sign from the WB traffic. This appears to be the only occasion where the barrier deviates from the double-sided corrugated beam set up. Consideration should be given to improving the VRS provision at the interface.

4.2 Traffic Volumes

Traffic volumes for the M48 have been taken in the M48 Mathern area of Monmouthshire from the Traffic Wales website between 21/05/21 and 10/03/22. All data is presented in Appendix B. The data is presented as Annual Average Daily Flow (AADT). 2021/22 figures indicate the following:

M48 Direction	AADT
Eastbound	6782
Westbound	6777

A sample of daily traffic count data for the ten years from 2010 to 2020 is shown below. All figures are estimated counts based on previous data using an algorithm unless shown otherwise.

Year	Traffic Flows	
	Eastbound All cars (%HGVs)	Westbound All cars (%HGVs)
2010	6418 (10%)	6780 (10%)
2011	6369 (10%)	6722 (9%)
2012	6204 (10%)	6543 (9%)
2013	6284 (10%)	6625 (9%)
2014	6518 (9%)	6869 (9%)
2015	6584 (9%)	6940 (9%)
2016	6705 (9%)	7066 (9%)
2017	6824 (9%)	7191 (9%)
2018 (manual count)	7846 (11%)	7904 (10%)
2019	7935 (11%)	7995 (10%)
2020	5527 (14%)	2224 (13%)

This data shows that the amount of traffic on the M48 was steadily increasing until the national lockdown measures of 2020 due to the Covid-19 pandemic.



4.3 Traffic Speed

The traffic data obtained from the Traffic Wales site for the M48 includes recorded traffic speeds. The survey results show the 85th percentiles being 78.9 mph eastbound and 76.1 mph westbound.

4.4 Personal Injury and accident damage

4.4.1 Personal Injury Accidents

Accident data held on the Welsh Governments IRIS system has been reviewed. This historical data can be used to determine the frequency or type of accidents encountered and any potential trends.

Please see the table below identifying the collision data over a nine-year period between 01/01/2012 – 31/12/2020.

All collisions on M48 and associated Junctions.

YEAR	FATAL	SERIOUS	SLIGHT	ALL
2012	1	0	1	2
2013	0	1	5	6
2014	0	0	3	3
2015	0	0	0	0
2016	1	1	2	4
2017	0	0	1	1
2018	0	1	0	1
2019	0	0	1	1
2020	0	1	0	1
Total	2	4	13	19

Further analysis of this collision data including recorded cause, weather patterns, and location shows that the following relate to the central reserve in some way.

Severity	Number
Slight	5
Serious	2
Fatal	1
Total	8

A map of these collisions is shown in Appendix B.

The collision of most interest to this report is a slight injury accident where a vehicle reported to be travelling at excess speed took a bend too quickly and crashed into the central reserve barrier before flipping over into the next carriageway.



This accident occurred on a left-hand bend that is one step below standards in the horizontal alignment. While the excess speed would have contributed, the barrier did fail to contain the vehicle within the carriageway on which it was travelling, however, it is possible that further detail is missing from the description and the vehicle may have “flipped” over the top without touching the barrier.

This accident occurred in fine weather, with no high winds, in dry daylight conditions when the driver was commuting to work.

4.4.2 Category 1 Defects – Accident Damage

In addition to formal accident data, a review has been undertaken of recorded category 1 defects associated with the safety barriers, caused by accident damage. Schedules of the recorded defects and repair instructions are contained in Appendix D. A summary of the data received for the last 5 years is presented in the table below. This information indicates the frequency of historical collisions between vehicles and central reserve safety barriers.

Year	Westbound Verge	Central Reserve		Eastbound Verge	Total
		Westbound	Eastbound		
2017	-	2	-	-	2
2018	3	6	2	1	12
2019	-	1	1	-	2
2020	1	7	1	2	11
2021	-	5	2	-	7
Total	4	21	6	3	34

4.4.3 Accident Damage Summary

The Cat 1 defects data shows that there are more collisions with the central reserve than indicated by the Personal Injury Accidents Data. The proportion of accidents in the westbound direction compared to eastbound demonstrates that cars are more likely to collide with the central reserve in that direction but the reason for this is unclear.

4.4.4 Summary of Existing Situation

Reports from SWTRA indicate the central reserve safety barrier is no longer serviceable and is unlikely to perform as intended during a collision.

Traffic volumes on the M48 are low for a motorway.

The 85th percentile of traffic is exceeding the speed limit.



Records of traffic collisions and instructions to undertake accident repairs to existing safety barriers have been provided by SWTRA and reviewed for the M48. There does not seem to be a clear cluster or causation of collisions.

It is of particular interest then that there were only 2 barrier collisions in 2019 and 1 further slight injury accident despite traffic levels being similar to the previous year where there were 13 total accidents.

A comparison review of the A40 Hardwick gyratory to Raglan roundabout was undertaken as the road has a similar standard and characteristics e.g. 2 lane, unlit, dual carriageway with a long stretch of featureless road. The A40 Cat 1 defects show only 17 collisions requiring repairs in the last 5 years compared to 34 for the M48.

This review generally indicates a comparatively high number of instances of collisions with the barrier within the length of interest on the M48.

5 Risk Assessment

An initial risk assessment has been undertaken, taking into consideration the findings and observations identified in this report. The risk assessment assesses the likelihood and severity of potential incidents involving errant vehicles striking the existing central reserve safety barrier. The risk assessment is presented in Appendix A.

It is acknowledged that it will take time to procure surveys, assessments, and a detailed design of a replacement central reserve barrier. Procurement and construction of the works will further increase the timescale for the installation of a fully compliant system. Budget constraints may also be a limiting factor.

The risk assessment confirms that there is currently a risk to road users along this section of the M48 which will remain until the barriers are permanently upgraded. A range of potential mitigation measures have been identified to reduce the risk in the intervening time, and then assessed to determine if the measure in question reduces the level of the risk to be as low as reasonably practicable (ALARP). Potential mitigation measures are listed and discussed in the following sections.

6 Options

The following immediate mitigation options have been identified for consideration while the permanent solution is investigated and designed:

- Do nothing
- Reduce speed limit. Introduce a temporary speed limit of 40 or 50mph to reduce the likelihood and severity of accidents



- Install a series of speed cameras or average speed cameras to improve compliance with the reduced speed limit
- Provide Variable Message Sign(s) in the vicinity, displaying relevant safety messages
- Decrease lane widths to increase the set back to the existing RRS
- Close lane 2 to traffic
- Installation of a secondary temporary RRS
- Total road closure

Each option is discussed in section 7 of this report with a final recommendation in section 10.

7 Discussion

Below is an expansion on the options listed in section 6 as well as an analysis into the likely level of disruption this would cause.

7.1 Do Nothing

The do-nothing option would only be considered if the existing RRS is in good condition and no safety concerns have been identified. This is the least disruptive option however it cannot be considered viable due to the RRS being expired, and the residual risk remaining

7.2 Apply a Reduced Speed Limit

Reducing the speed limit may also reduce the likelihood and severity of accidents. The existing speed limit on this section of the M48 is national speed limit. The speed data indicates the 85th percentile is travelling higher than the speed limit.

It is suggested that a proposed reduced speed limit of 50mph is used in this instance. Temporary mandatory speed limits, correctly signed and supported by an appropriate traffic order are recommended as road users are less likely to comply with advisory speed limits.

Resultant traffic speeds should be monitored to confirm compliance. If speed limit compliance is found to be poor, supplementary measures such as speed activated variable message signs or temporary average speed cameras should also be employed. See paragraphs 7.3 and 7.4.

This is a minimally disruptive option as a reduction in speed limit would only result in a delay of less than 4 minutes over the length of the M48 in question.



7.3 Speed Enforcement

The installation of temporary speed cameras should be considered if implementing a reduced speed limit to act as a greater deterrent for those drivers ignoring the new speed limit.

The installation of a new speed camera system may be costly and will take time to implement. Requesting assistance from the police may also be considered in enforcing the speed limit in the area.

As above, this is a minimally disruptive solution causing a delay of less than 4 minutes to traffic.

7.4 Installation of Variable Message Signs

Placing temporary variable message signs (VMS) with useful, informative messages will assist in reducing accidents. The messages can display messages about the highway layout or traffic information or be speed activated. There is sufficient space within the highway boundary along the route that could accommodate such signs.

This is a minimally disruptive solution and should only serve to alter the driver's actions by providing advice and information at critical points. Speed activated VMS signs could be considered to notify those drivers travelling at excessive speeds.

7.5 Reduced Lane Widths

The reduction of the lane widths would increase the setback from lane 2 to the central reserve RRS would reduce the likelihood of an errant vehicle strike. This option may also increase the likelihood of other accidents such as vehicle collisions on the running lanes, so additional measures, such as reduced speed limits, should be used.

Costs to remove existing road markings and studs, install narrow lanes and ongoing maintenance costs are high, yet yields a residual risk score comparable with installation of a temporary speed limit.

This is a moderately disruptive solution as it would require installation of signage, road lining, and studs to demonstrate the new lane arrangement.

7.6 Close Lane 2 to Traffic

Closing lane 2 would increase the setback to the central reserve safety barriers, reducing the risk of an errant vehicle colliding with the central reserve.



In ordinary conditions, it is considered that traffic flows would remain largely unaffected, although the effect on congestion of westbound traffic around Junction 2 Newhouse should be investigated.

A single trafficked lane would remove any resilience for additional traffic volumes caused by maintenance or emergency closures of the M4 Prince of Wales bridge, as the M48 would form the diversion route for affected vehicles. It may also increase the risk of other accidents such as rear end shunts and side swipes on the approaching tapers.

7.7 Installation of a Secondary Temporary RRS

As mentioned previously, reducing lane widths may also increase the likelihood of other accidents such as side swipe collisions in the running lane so when combined with a reduced speed limit, that should mitigate the increased risk.

The increase set back from lane 2 to the central reserve barrier would also provide sufficient space to install a temporary secondary barrier in the central reserve/lane 2. This would allow SWTRA to have confidence in the reliability of the barriers performance while exploring permanent solutions.

With the main risk thought to be crossing incidents, this report considers the provision of one line of double-sided temporary barrier along the offside edge of one carriageway.

This combination of mitigation measures would be extremely expensive and moderately disruptive as it would require in installation of road lines as above but also a secondary barrier and signage to highlight the new road layout as well as the reduced speed limit.

7.8 Total Road Closure

Closing this section of the M48 would eliminate the risk of accidents to the central reserve barrier, however, this would be highly disruptive and very impractical and would cause severe delays, increased traffic on county roads and general frustration to road users and residents. Additionally, this would reduce the overall resilience of the road network if the M4 Prince of Wales bridge needed to be closed.



8 Mitigation Option Summary

Option Ref	Mitigation Measure	Resultant Risk Score	Estimated installation and maintenance cost (1 year)	Effect on Traffic Flow	Comments
1	Do Nothing	15	£0	<ul style="list-style-type: none"> No impact on traffic flow 	<ul style="list-style-type: none"> Should not be considered
2	Application of a Reduced Speed Limit	6	£142,500 Assumes permanent signage to avoid maintenance costs for temporary. Also illuminated terminal signs.	<ul style="list-style-type: none"> No impact on traffic flow 	<ul style="list-style-type: none"> Dependent upon anticipated procurement of design and construction, costs assume permanent signing will be installed to remove maintenance costs associated with temporary signage
3	Speed Enforcement (in Conjunction with Reduced Speed Limit)	-	£287,000 (in addition to speed limit signing) Costs include installation, 1 year maintenance and removal	<ul style="list-style-type: none"> Should assist in regulating traffic speeds No impact on traffic flow 	<ul style="list-style-type: none"> This would be an "add-on" to option refs 2, 5, 6 and 7 should traffic speed compliance be poor
4	Installation of Variable Message Signs	-	£42,000 Includes 6 signs installed, 1 year maintenance and removal. (In addition to speed limit signing)	<ul style="list-style-type: none"> Should assist in regulating traffic speeds No impact on traffic flow 	<ul style="list-style-type: none"> This would be an "add-on" to option refs 2, 5, 6 and 7 should traffic speed compliance be poor
5	Installation of Narrow Lanes	6	£5,300,000 Installed, 1 year	<ul style="list-style-type: none"> Driver caution when 	<ul style="list-style-type: none"> Operated in conjunction with



Option Ref	Mitigation Measure	Resultant Risk Score	Estimated installation and maintenance cost (1 year)	Effect on Traffic Flow	Comments
			maintenance and removal (in addition to speed limit signing)	<ul style="list-style-type: none"> overtaking larger vehicles No impact on traffic flow 	<ul style="list-style-type: none"> temporary speed limit Significant installation, maintenance and removal costs Exposes additional workforce to increased risks due to installation, maintenance and removal liabilities
6	Installation of Lane 2 Closure	4	£1,400,000 Installed, 1 year maintenance and removal (in addition to speed limit signing)	<ul style="list-style-type: none"> Potential increase in congestion on M48 Increase driver frustration as a long length of closure would be required, with road users perceiving that no works are being undertaken. 	<ul style="list-style-type: none"> Operated in conjunction with temporary speed limit Significant, maintenance and removal costs Exposes additional workforce to increased risks due to installation, maintenance and removal liabilities
7	Installation of Temporary Safety Barriers	6	£6,265,000 Includes install, 1 year maintenance and removal of narrow lanes on both carriageways and temp VRS on one carriageway.	<ul style="list-style-type: none"> Increase congestion Increase driver frustration as a long length of closure would be required, with road users 	<ul style="list-style-type: none"> Operated in conjunction with temporary speed limit and narrow lanes or lane closure May become an obstruction to users



Option Ref	Mitigation Measure	Resultant Risk Score	Estimated installation and maintenance cost (1 year)	Effect on Traffic Flow	Comments
			(In addition to speed limit signing)	perceiving that no works are being undertaken.	constructing new barriers <ul style="list-style-type: none"> Exposes additional workforce to increased risks due to installation, maintenance and removal liabilities
8	Total road closure	1	£2,350,000 Includes install, 1 year maintenance and removal, with diversions along the M4 for all traffic.	<ul style="list-style-type: none"> Increase in congestion on M4 and county roads Increase driver frustration as a long length of closure would be required, with road users perceiving that no works are being undertaken. 	<ul style="list-style-type: none"> Removes M48 as a diversion route and decreases the overall resilience of the route Services at Aust adversely affected Affects National Highways Network

9 Conclusions

The South Wales Trunk Road Agent (SWTRA) have identified the poor condition of the central reserve barrier on the M48. It has been reported to WSP that records indicate the double-sided safety barrier in the central reserve is no longer serviceable and therefore life expired and not expected to perform in a collision as intended.

Although traffic flows are relatively low for a motorway, the speed of traffic is of concern. As the central reserve safety barrier is unlikely to perform as intended, it is unlikely to contain an errant vehicle, particularly travelling at excessive speed. Although the likelihood hood is low, based on the type and number of historical collisions, the potential severity of an incident is high,



especially when considering the outcome of an errant vehicle crossing through the central reserve into oncoming traffic.

This report considers that mitigation measures should be employed to reduce the risk of a vehicle losing control and collision with the central reserve for the period of time until the central reserve barrier can be upgraded.

10 Recommendations

Until permanent works to upgrade the central reserve VRS are implemented, measures to mitigate against the risk of a collision with RRS should be implemented due to uncertainty over performance/effectiveness of the existing life expired system. Reviewing the historical collision data to determine accident trends, it is reasonable to assume that a reduction in traffic speeds is likely to reduce the risk of vehicles leaving the carriageway to an acceptable level. However, reviewing the accident and damage repair data did not reveal any trends or hotspots on this stretch of the M48.

It is therefore recommended that a mandatory temporary speed limit of 50 mph should be implemented initially. Ordinarily, monitoring of compliance with the reduced speed limit would be recommended. However, as the 85th percentile speed indicates that road users do not abide the permanent speed limit, it is recommended that speed enforcement measures are introduced with the reduced speed limit. Costs for the speed limit and Average Speed Enforcement are likely to be in the region of £430,000, including maintenance of the average speed cameras for one year.

Traffic orders will be required for the temporary reduced speed limit.

It should be noted that the above control measures will not fully remove the risk of crossover incidents and it should be reiterated that permanent works to replace life expired safety barriers should be implemented as soon as possible.



Appendix A – Risk Assessment

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Ref	Hazard/Risk Description	Risk			Response/ Control Measure	Residual Risk			Monitoring and Supplementary Control Methods
		L	S	R		L	S	R	
1	Crossover incident whereby an errant vehicle passes through the RRS into the opposite carriageway.	2	5	10	<ul style="list-style-type: none"> Replace existing barrier with a compliant RRS to CD377 	1	2	2	Replacement VRS design to be determined from RRRAP assessment
2	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a vehicle collision with the barrier.	5	3	15	<ul style="list-style-type: none"> Do Nothing 	5	3	15	The existing safety barriers will not perform as intended under impact and are an unacceptable risk so must be replaced with consideration to mitigation measures to be implemented as soon as possible and maintained until safety barrier upgrades are complete. RRRAP assessment should be undertaken along the length of the M48 to confirm minimum length of need of full height barrier requirements.
3	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a collision	5	3	15	<ul style="list-style-type: none"> Implement a temporary reduced speed limit of 50mph along the route, supported by traffic signing in compliance with Chapter 3 of the Traffic Signs Manual and a temporary traffic order 	3	2	6	Vehicle compliance to reduced speed limit, implementation of speed activated variable message signs or temporary average speed cameras is recommended

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Ref	Hazard/Risk Description	Risk			Response/ Control Measure	Residual Risk			Monitoring and Supplementary Control Methods
		L	S	R		L	S	R	
4	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a collision	5	3	15	Installation of temporary narrow lanes to increase the setback to existing VRS, thus moving traffic away from the hazard. <ul style="list-style-type: none"> Should be implemented in conjunction with a temporary speed limit. 	3	2	6	Vehicle compliance to reduced speed limit should be monitored. Should compliance be unacceptable, consider implementation of speed activated variable message signs or temporary average speed cameras
5	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a collision	5	3	15	Installation of temporary safety barrier in front of the central reserve <ul style="list-style-type: none"> Likely to require installation alongside narrow lanes to ensure setbacks and working widths are compliant. Therefore, should also be implemented alongside a temporary speed limit and a temporary secondary containment barrier. 	3	2	6	Vehicle compliance to reduced speed limit should be monitored. Should compliance be unacceptable, consider implementation of speed activated variable message signs or temporary average speed cameras

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Ref	Hazard/Risk Description	Risk			Response/ Control Measure	Residual Risk			Monitoring and Supplementary Control Methods
		L	S	R		L	S	R	
6	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a collision	5	3	15	Installation of lane 2 closure to increase the setback to existing VRS, thus moving traffic away from the hazard. Also eliminates lane switching <ul style="list-style-type: none"> - Should be implemented in conjunction with a temporary speed limit 	2	2	4	Vehicle compliance to reduced speed limit, implementation of speed activated variable message signs or temporary average speed cameras is recommended
7	Until VRS is replaced, the existing barrier holds no structural integrity and therefore may have little or a detrimental effect in a collision	5	3	15	Total closure of the M48	1	1	1	Whilst the residual risk the vehicles on the M48 is effectively zero due to being unable to access the route. The risk to road users would increase slightly due to added congestion on country roads, and the M4. As such all monitoring and supplementary control systems would relate to congestion management on the M4 and other alternate routes. Congestion on major routes would need to be monitored.

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Ref	Hazard/Risk Description	Risk			Response/ Control Measure	Residual Risk			Monitoring and Supplementary Control Methods
		L	S	R		L	S	R	
8	Poor lane discipline resulting in side-swiping between vehicles in narrow lanes situation	2	3	6	Introduce measures to improve lane discipline such as "Stay in lane" signs, or "check your blind spot" messages via VMS	1	3	3	Vehicle compliance to reduced speed limit should be monitored. Should compliance be unacceptable, consider implementation of speed activated variable message signs or temporary average speed cameras
9	The existing barrier is currently considered life expired and there uncertainty of its performance under impact. When impacted the barrier could increase the severity of the collision by increasing the risk of secondary incidents due to the scattering of debris creating a hazard	4	3	12	Replace existing barrier with a compliant RRS to CD377	1	2	2	Replacement VRS design to be determined from RRRAP assessment

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Ref	Hazard/Risk Description	Risk			Response/ Control Measure	Residual Risk			Monitoring and Supplementary Control Methods
		L	S	R		L	S	R	
10	The existing barrier is currently considered life expired and there uncertainty of its performance under impact. When impacted the barrier could increase the severity of the collision by warping, buckling, or deforming on impact.	4	3	12	Replace existing barrier with a compliant RRS to CD377	1	2	2	Replacement VRS design to be determined from RRRAP assessment
11	The existing barrier is currently considered life expired and there uncertainty of its performance under impact. When impacted the barrier could increase the severity of the collision by sheering and creating sharp hazards at the point of collision.	4	5	20	Replace existing barrier with a compliant RRS to CD377	1	2	2	Replacement VRS design to be determined from RRRAP assessment



Definitions:

- Activity – The function(s) carried out by individuals or groups
- Hazard - A source of potential harm, loss or failure.
- Mitigation Measures – control measures to eliminate, minimise or control the risk
- Residual Risk – remaining risks following implementation of control measures

Likelihood (L) x Severity (S) = Risk value (R)		Severity (S)				
		Minor harm; Minor damage or loss no injury	Moderate harm; Slight injury or illness, moderate damage or loss	Serious harm; Serious injury or illness, substantial damage or loss	Major harm; Fatal injury, major damage or loss	Extreme harm; Multiple fatalities, extreme loss or damage
Likelihood (L)	Very unlikely; Highly improbable, not known to occur	1	2	3	4	5
	Unlikely; Less than 1 per 10 years	2	4	6	8	10
	May happen; Once every 5-10 years	3	6	9	12	15
	Likely; Once every 1-4 years	4	8	12	16	20
	Almost certain; Once a year or more	5	10	15	20	25
Risk Value (R)		Required action				
Low (1-9)		Ensure assumed control measures are maintained and reviewed as necessary.				
Medium (10-19)		Additional control measures needed to reduce risk rating to a level which is equivalent to a test of "reasonably required" for the population concerned.				
High (20-25)		Activity not permitted. Hazard to be avoided or risk to be reduced to tolerable.				

Extract from GG104 Revision 0 – Requirements for Safety Risk Assessment



Appendix B – Traffic Flow and Speed Data

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year	road name	easting	northing	estimation method	estimation method detailed	direction of travel	pedal cycles	two wheeled			hgvs 3 or more							all motor vehicles	
								motor vehicles	cars and taxis	buses and coaches	hgvs 2 rigid axle	hgvs 3 rigid axle	hgvs 4 or more rigid axle		hgvs 5 articulate d axle	hgvs 6 articulate d axle	all hgvs		
													rigid axle	articulate d axle					
2000	M48	350000	191150	Counted	Manual count	E	0	38	4520	55	579	280	35	43	64	259	55	736	5928
2000	M48	350000	191150	Counted	Manual count	W	0	47	3920	34	468	239	31	26	46	204	72	618	5087
2001	M48	350000	191150	Estimated	Estimated using	E	0	40	4741	57	589	278	41	44	59	232	64	718	6145
2001	M48	350000	191150	Estimated	Estimated using	W	0	50	4112	36	476	237	36	26	42	183	84	608	5282
2002	M48	350000	191150	Counted	Manual count	E	0	26	3945	44	724	240	23	17	89	315	94	778	5517
2002	M48	350000	191150	Counted	Manual count	W	0	28	4569	28	802	223	26	23	70	268	111	721	6148
2003	M48	350000	191150	Estimated	Estimated using	E	0	26	4059	48	759	245	25	19	85	279	103	756	5648
2003	M48	350000	191150	Estimated	Estimated using	W	0	28	4702	30	841	227	28	26	67	238	122	708	6309
2004	M48	350000	191150	Counted	Manual count	E	0	28	4703	44	661	288	37	34	80	282	213	934	6370
2004	M48	350000	191150	Counted	Manual count	W	0	38	5541	42	803	273	50	32	68	267	181	871	7295
2005	M48	350000	191150	Estimated	Estimated using	E	0	24	4811	38	724	279	35	35	71	249	227	896	6493
2005	M48	350000	191150	Estimated	Estimated using	W	0	33	5668	37	880	265	47	32	61	236	194	835	7453
2006	M48	350000	191150	Estimated	Estimated using	E	0	31	4787	36	765	298	36	39	64	220	244	901	6520
2006	M48	350000	191150	Estimated	Estimated using	W	0	41	5640	34	930	282	49	37	54	209	208	839	7484
2007	M48	350000	191150	Estimated	Estimated using	E	0	34	4859	38	844	293	36	42	56	212	254	893	6668
2007	M48	350000	191150	Estimated	Estimated using	W	0	46	5725	36	1026	277	48	40	47	201	216	829	7662
2008	M48	350000	191150	Counted	Manual count	E	0	28	5111	46	818	225	30	36	52	224	141	708	6711
2008	M48	350000	191150	Counted	Manual count	W	0	28	5439	29	865	225	28	46	59	281	105	744	7105
2009	M48	350000	191150	Estimated	Estimated using	E	0	28	5039	52	832	214	31	36	47	190	135	653	6604
2009	M48	350000	191150	Estimated	Estimated using	W	0	28	5363	33	880	214	29	45	54	239	100	681	6985
2010	M48	350000	191150	Estimated	Estimated using	E	0	26	4848	58	839	216	30	30	55	180	136	647	6418
2010	M48	350000	191150	Estimated	Estimated using	W	0	26	5159	37	887	216	28	37	63	226	101	671	6780
2011	M48	350000	191150	Estimated	Estimated using	E	0	25	4809	65	855	204	31	32	41	170	137	615	6369
2011	M48	350000	191150	Estimated	Estimated using	W	0	25	5118	42	904	204	29	39	46	213	102	633	6722
2012	M48	350000	191150	Estimated	Estimated using	E	0	22	4675	69	848	193	32	34	31	162	140	591	6204
2012	M48	350000	191150	Estimated	Estimated using	W	0	22	4975	45	896	193	30	42	34	203	104	606	6543
2013	M48	350000	191150	Estimated	Estimated using	E	0	21	4672	69	919	196	35	39	24	161	149	603	6284
2013	M48	350000	191150	Estimated	Estimated using	W	0	21	4972	45	971	196	32	48	27	202	111	615	6625
2014	M48	350000	191150	Estimated	Estimated using	E	0	23	4802	68	1042	183	35	39	24	147	156	584	6518
2014	M48	350000	191150	Estimated	Estimated using	W	0	23	5111	44	1101	183	33	48	26	184	116	591	6869
2015	M48	350000	191150	Estimated	Estimated using	E	0	25	4792	64	1114	182	38	39	29	145	155	588	6584
2015	M48	350000	191150	Estimated	Estimated using	W	0	25	5100	42	1178	182	35	47	32	182	115	595	6940
2016	M48	350000	191150	Estimated	Estimated using	W	0	26	5142	41	1251	192	35	55	33	172	120	607	7066
2016	M48	350000	191150	Estimated	Estimated using	E	0	26	4831	63	1183	192	37	45	30	137	161	602	6705
2017	M48	350000	191150	Estimated	Estimated using	E	0	24	4826	62	1283	202	39	50	30	141	167	630	6824
2017	M48	350000	191150	Estimated	Estimated using	W	0	24	5136	40	1356	202	37	61	34	177	124	635	7191
2018	M48	347895	189460	Counted	Manual count	E	0	39	5859	73	1034	244	31	39	163	254	109	841	7846
2018	M48	347895	189460	Counted	Manual count	W	0	35	6007	48	1026	259	26	56	110	252	84	788	7904
2019	M48	347895	189460	Estimated	Estimated using	E	0	38	5949	73	1033	243	33	41	162	253	110	841	7935
2019	M48	347895	189460	Estimated	Estimated using	W	0	34	6099	48	1025	258	27	59	110	251	85	789	7995
2020	M48	347895	189460	Estimated	Estimated using	E	0	21	3843	39	858	213	29	37	148	239	100	766	5527
2020	M48	347895	189460	Estimated	Estimated using	W	0	19	3940	26	851	226	24	54	100	236	77	718	5554

Site Number 00000002

Site Reference 100480200002

Lat/Lng. 51.61760,-2.72014

M48 Mathern Gwent

Speed Summary (Mon-Sun)-Speed Limit 70 Mph

From 21/05/2021 To 01/01/2022

Channel: West

	Average Volume	85th Percentile	Mean Average	Standard Deviation	<40Mph	40-<45	45-<50	50-<55	55-<60	60-<65	65-<70	70-<75	75-<80	80-<85	85-<90	90-<95	=>95
00:00	85	75.6	65.0	10.6	0	0	3	13	15	10	17	11	7	3	2	1	1
01:00	62	74.7	63.5	10.8	0	0	3	13	14	5	10	7	5	2	1	1	1
02:00	62	74.5	63.4	10.8	0	0	3	14	13	6	10	7	4	2	1	1	1
03:00	73	73.6	62.4	10.7	0	1	4	18	16	7	11	8	5	2	1	1	1
04:00	86	73.1	61.8	10.5	0	0	3	26	18	8	12	8	5	2	1	1	1
05:00	204	76.4	65.8	10.3	0	0	6	29	31	28	44	30	18	9	5	2	2
06:00	265	76.2	65.7	10.0	0	1	10	34	41	34	58	41	26	12	5	2	1
07:00	389	77.9	68.2	9.7	0	0	5	31	48	50	94	76	45	21	10	5	4
08:00	348	76.5	67.2	9.2	0	0	4	32	49	45	87	66	37	17	6	2	2
09:00	364	75.2	66.4	9.0	0	0	5	36	54	55	92	64	34	14	5	2	1
10:00	413	75.0	66.3	8.9	0	0	6	39	62	65	105	73	37	15	6	2	2
11:00	460	75.3	66.7	8.9	0	0	7	39	66	73	119	84	43	18	7	3	2
12:00	469	76.0	67.1	8.9	0	1	6	35	65	75	122	85	46	20	8	3	2
13:00	484	76.5	67.4	9.0	0	0	6	35	66	76	125	88	50	23	9	4	3
14:00	530	77.1	67.9	9.1	0	0	5	35	68	81	137	99	58	27	12	5	4
15:00	598	78.2	68.8	9.2	0	0	5	32	67	87	151	117	72	36	16	7	5
16:00	650	78.8	69.6	9.1	0	0	5	29	62	91	163	136	87	43	21	8	5
17:00	606	79.3	70.0	9.2	0	0	4	25	54	80	150	128	84	43	21	8	6
18:00	454	79.2	69.6	9.4	0	0	4	22	43	65	111	90	60	32	16	6	5
19:00	243	78.4	68.6	9.8	0	1	4	15	27	36	60	45	28	14	8	3	3
20:00	167	77.4	67.4	10.1	0	0	4	14	21	25	40	28	17	8	4	2	2
21:00	149	77.1	67.1	9.9	0	0	3	14	20	22	35	25	15	8	4	2	2
22:00	171	77.3	67.5	9.9	0	1	3	14	22	25	40	31	17	8	4	2	2
23:00	138	79.0	68.2	10.6	0	0	3	12	18	18	31	22	16	9	5	2	2
Totals																	
12H(7-19)	5765	77.5	68.1	9.2	2	5	63	390	705	843	1455	1106	653	310	139	54	41
16H(6-22)	6589	77.5	68.0	9.3	2	7	84	467	814	960	1648	1244	739	351	159	63	50
18H(6-24)	6898	77.6	68.0	9.4	2	8	90	493	855	1003	1719	1297	772	369	168	67	54
24H(0-24)	7469	77.4	67.7	9.5	3	10	111	606	962	1068	1823	1368	817	390	180	72	60
AM Peak	11:00	07:00	07:00	01:00	11:00	06:00	06:00	10:00	11:00	11:00	11:00	11:00	07:00	07:00	07:00	07:00	07:00
	460	77.9	68.2	10.8	0	1	10	39	66	73	119	84	45	21	10	5	4
PM Peak	16:00	17:00	17:00	23:00	15:00	19:00	12:00	12:00	14:00	16:00	16:00	16:00	16:00	16:00	17:00	17:00	17:00
	650	79.3	70.0	10.6	0	1	6	35	68	91	163	136	87	43	21	8	6

Site Number 00000002

Site Reference 100480200002

Lat/Lng. 51.61760,-2.72014

M48 Mathern Gwent

Speed Summary (Mon-Sun)-Speed Limit 70 Mph

From 21/05/2021 To 01/01/2022

Channel: East

	Average Volume	85th Percentile	Mean Average	Standard Deviation	<40Mph	40-<45	45-<50	50-<55	55-<60	60-<65	65-<70	70-<75	75-<80	80-<85	85-<90	90-<95	=>95
00:00	62	76.8	65.1	11.3	0	0	3	10	14	5	10	8	6	3	2	1	1
01:00	50	74.8	63.9	10.9	0	0	2	9	13	4	8	6	4	2	1	1	1
02:00	51	74.5	63.8	10.5	0	0	2	8	14	6	8	6	4	2	1	1	0
03:00	72	75.5	65.4	10.3	0	0	2	9	13	9	15	10	6	3	2	1	1
04:00	102	78.0	67.3	10.6	0	0	2	10	17	13	21	16	11	6	3	1	2
05:00	259	79.2	69.4	9.8	0	0	2	15	30	34	60	50	35	17	9	4	4
06:00	452	80.7	70.8	9.8	0	0	4	20	42	48	103	96	67	37	19	9	8
07:00	572	81.2	70.9	10.0	1	1	4	30	52	56	125	121	84	51	27	12	8
08:00	487	79.9	69.8	10.1	1	0	5	32	52	49	105	100	70	39	21	7	5
09:00	401	78.7	68.6	9.9	0	0	5	31	51	46	90	80	49	26	13	6	3
10:00	388	78.1	68.2	9.8	0	0	5	31	52	45	91	77	45	23	11	4	3
11:00	412	78.5	68.5	9.8	0	0	5	33	55	45	95	81	51	26	12	5	4
12:00	439	78.7	68.8	9.8	0	0	5	34	54	46	101	90	57	29	13	5	4
13:00	468	79.2	69.3	9.9	0	0	5	35	55	46	103	99	64	33	16	7	5
14:00	441	79.4	69.4	10.0	0	0	5	32	52	44	96	90	61	32	16	7	6
15:00	404	79.7	70.0	9.9	0	0	4	26	43	39	89	85	59	32	15	6	5
16:00	442	79.9	70.5	9.5	0	0	3	22	41	43	102	99	66	35	17	7	5
17:00	482	80.6	71.1	9.6	0	0	4	21	39	47	109	109	75	41	21	9	8
18:00	369	80.8	70.9	9.9	0	0	4	18	31	36	82	83	54	31	17	7	6
19:00	217	80.4	70.3	10.2	0	0	2	13	22	21	47	46	30	17	9	4	4
20:00	175	79.8	69.8	10.2	0	0	2	10	20	18	39	36	23	13	6	3	3
21:00	183	78.9	68.9	10.1	0	0	3	12	22	23	42	36	22	12	6	3	3
22:00	178	79.4	68.9	10.5	0	0	4	13	22	21	39	34	21	12	6	3	3
23:00	95	77.9	66.8	10.8	0	0	3	11	17	10	18	15	11	5	3	1	1
Totals																	
12H(7-19)	5303	79.6	69.7	9.9	3	3	53	345	576	544	1189	1113	736	398	198	82	64
16H(6-22)	6331	79.7	69.8	9.9	3	4	65	400	682	653	1420	1327	878	477	238	101	82
18H(6-24)	6605	79.7	69.7	10.0	3	5	71	424	721	684	1477	1376	910	494	247	105	87
24H(0-24)	7202	79.6	69.5	10.0	4	6	85	485	822	756	1599	1472	975	526	264	113	95
AM Peak	07:00	07:00	07:00	00:00	08:00	07:00	11:00	11:00	11:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00
	572	81.2	70.9	11.3	1	1	5	33	55	56	125	121	84	51	27	12	8
PM Peak	17:00	18:00	17:00	23:00	12:00	22:00	12:00	13:00	13:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00
	482	80.8	71.1	10.8	0	0	5	35	55	47	109	109	75	41	21	9	8

Site Number 00000002

Site Reference 100480200002

Lat/Lng. 51.61760,-2.72014

M48 Mathern Gwent

Speed Summary (Mon-Sun)-Speed Limit 70 Mph

From 01/01/2022 To 10/03/2022

Channel: West

	Average Volume	85th Percentile	Mean Average	Standard Deviation	<40Mph	40-<45	45-<50	50-<55	55-<60	60-<65	65-<70	70-<75	75-<80	80-<85	85-<90	90-<95	=>95
00:00	76	74.6	64.1	10.1	0	0	3	13	13	10	15	10	7	2	1	0	0
01:00	57	73.3	62.2	10.6	0	0	4	14	12	5	9	6	3	2	1	1	0
02:00	58	73.1	62.5	10.2	0	0	2	14	12	7	10	6	4	2	1	0	0
03:00	70	71.9	61.4	9.9	0	0	3	20	14	8	11	7	3	2	1	0	0
04:00	84	70.6	60.5	9.6	0	0	4	28	17	8	12	7	4	1	1	0	0
05:00	201	74.7	64.4	10.0	0	1	8	34	32	28	44	26	16	7	4	1	1
06:00	260	74.6	64.6	9.6	0	1	10	39	41	38	55	39	22	10	3	1	0
07:00	377	76.8	67.3	9.4	0	1	5	37	47	52	92	71	41	17	8	3	2
08:00	350	75.8	66.7	9.1	0	0	4	39	47	47	88	66	35	15	5	2	1
09:00	343	74.3	65.5	8.8	0	0	6	39	56	54	89	55	27	10	4	2	1
10:00	360	74.2	65.3	8.9	0	1	7	43	57	61	89	57	28	11	4	2	1
11:00	414	74.3	65.7	8.8	0	1	7	43	62	68	107	74	32	12	5	2	1
12:00	419	74.7	66.0	8.8	0	1	7	39	62	72	110	68	35	15	5	2	2
13:00	429	75.0	66.3	8.9	0	1	6	40	62	77	109	70	38	16	6	3	2
14:00	489	76.2	67.0	9.0	0	0	7	38	66	82	125	85	49	22	8	3	3
15:00	540	77.0	67.8	9.0	0	0	6	36	66	86	140	101	59	27	11	4	3
16:00	593	78.1	68.9	8.9	0	1	5	30	58	88	155	119	76	36	14	5	4
17:00	539	77.5	68.6	8.8	0	1	5	29	52	84	143	112	65	29	12	5	3
18:00	390	77.4	68.0	9.2	0	1	5	26	44	62	97	74	44	21	10	3	2
19:00	201	77.2	67.3	9.8	0	1	5	16	25	34	47	34	20	10	5	2	2
20:00	131	76.6	66.2	10.4	0	0	4	15	18	20	29	19	12	6	3	1	2
21:00	115	76.3	66.4	9.9	0	0	3	12	17	18	28	17	11	5	3	1	1
22:00	156	76.6	67.0	9.8	0	0	4	14	20	26	37	27	15	7	4	2	1
23:00	126	77.4	67.1	10.2	0	0	3	12	18	17	29	20	13	6	3	1	2
Totals																	
12H(7-19)	5242	76.2	67.1	9.0	2	7	71	437	679	833	1343	952	531	233	92	36	26
16H(6-22)	5949	76.2	66.9	9.2	3	10	93	519	780	943	1503	1061	597	263	105	41	31
18H(6-24)	6231	76.3	67.0	9.2	3	11	99	546	817	986	1569	1109	624	277	112	45	34
24H(0-24)	6777	76.1	66.6	9.3	4	13	123	669	917	1052	1669	1171	661	293	121	48	37
AM Peak	11:00	07:00	07:00	01:00	10:00	06:00	06:00	11:00	11:00	11:00	11:00	11:00	07:00	07:00	07:00	07:00	07:00
	414	76.8	67.3	10.6	0	1	10	43	62	68	107	74	41	17	8	3	2
PM Peak	16:00	16:00	16:00	20:00	12:00	17:00	14:00	13:00	14:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00
	593	78.1	68.9	10.4	0	1	7	40	66	88	155	119	76	36	14	5	4

Site Number 00000002

Site Reference 100480200002

Lat/Lng. 51.61760,-2.72014

M48 Mathern Gwent

Speed Summary (Mon-Sun)-Speed Limit 70 Mph

From 01/01/2022 To 10/03/2022

Channel: East

	Average Volume	85th Percentile	Mean Average	Standard Deviation	<40Mph	40-<45	45-<50	50-<55	55-<60	60-<65	65-<70	70-<75	75-<80	80-<85	85-<90	90-<95	=>95
00:00	58	75.8	64.6	11.1	0	0	3	9	14	5	10	8	5	2	1	1	1
01:00	47	73.9	63.2	10.4	0	0	1	9	14	4	7	5	3	1	1	0	1
02:00	46	73.8	63.5	10.2	0	0	2	7	12	5	8	5	3	1	1	0	0
03:00	66	74.4	64.7	10.0	0	0	2	8	14	9	13	9	5	2	1	1	0
04:00	102	77.2	66.9	10.2	0	0	2	10	16	15	22	16	10	5	3	1	1
05:00	251	78.3	68.7	9.3	0	0	2	14	32	35	60	49	31	15	8	3	2
06:00	431	78.8	69.4	9.3	0	0	4	21	49	50	102	93	60	29	13	5	4
07:00	566	79.5	69.9	9.5	0	0	5	32	59	58	129	124	83	44	20	8	5
08:00	522	79.5	69.9	9.5	0	0	4	32	58	52	112	113	82	41	19	6	4
09:00	394	78.6	68.6	9.8	0	0	4	30	54	42	87	81	49	27	11	5	3
10:00	365	78.2	68.0	9.8	0	0	5	30	56	38	82	72	41	23	10	4	3
11:00	357	78.3	68.2	9.8	0	0	4	30	52	38	81	71	43	23	10	4	3
12:00	384	78.8	68.9	9.7	0	0	4	28	51	37	87	80	52	26	11	5	4
13:00	418	79.1	69.2	9.9	0	0	4	31	54	39	92	89	56	29	14	5	4
14:00	407	79.2	69.3	9.9	0	0	4	29	51	40	89	85	56	29	14	6	4
15:00	376	79.3	69.8	9.6	0	0	3	22	43	35	85	83	54	28	13	5	4
16:00	418	79.8	70.7	9.2	0	0	3	17	38	40	97	97	65	35	15	6	4
17:00	450	79.5	70.3	9.3	0	0	4	20	40	49	106	101	68	35	15	6	4
18:00	341	78.4	69.1	9.4	0	0	4	20	34	42	83	75	43	21	10	3	3
19:00	206	78.5	69.1	9.5	0	0	2	12	25	24	47	45	26	13	6	3	2
20:00	144	78.6	69.0	9.9	0	0	2	9	17	17	33	30	18	9	5	2	2
21:00	170	78.4	68.4	9.9	0	0	2	12	23	22	38	32	21	10	5	2	2
22:00	173	78.7	68.4	10.3	0	0	4	13	23	21	38	32	21	10	5	3	3
23:00	89	77.1	66.3	10.6	0	0	2	11	17	9	16	15	9	4	2	1	1
Totals																	
12H(7-19)	4999	79.2	69.4	9.6	2	3	47	320	589	511	1130	1072	692	360	164	65	45
16H(6-22)	5950	79.1	69.4	9.6	3	4	58	374	703	623	1351	1273	818	421	192	77	55
18H(6-24)	6212	79.1	69.3	9.7	3	5	64	397	743	653	1405	1320	848	435	199	80	58
24H(0-24)	6782	78.9	69.1	9.7	3	6	77	454	845	726	1525	1413	905	463	214	86	64
AM Peak	07:00	08:00	07:00	00:00	07:00	06:00	10:00	08:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00
	566	79.5	69.9	11.1	0	0	5	32	59	58	129	124	83	44	20	8	5
PM Peak	17:00	16:00	16:00	23:00	18:00	18:00	18:00	13:00	13:00	17:00	17:00	17:00	17:00	16:00	16:00	17:00	17:00
	450	79.8	70.7	10.6	0	0	4	31	54	49	106	101	68	35	15	6	4



Appendix C – Route Plan with Horizontal Geometry and Collision Information

M48 Central Reserve Safety Barrier Review

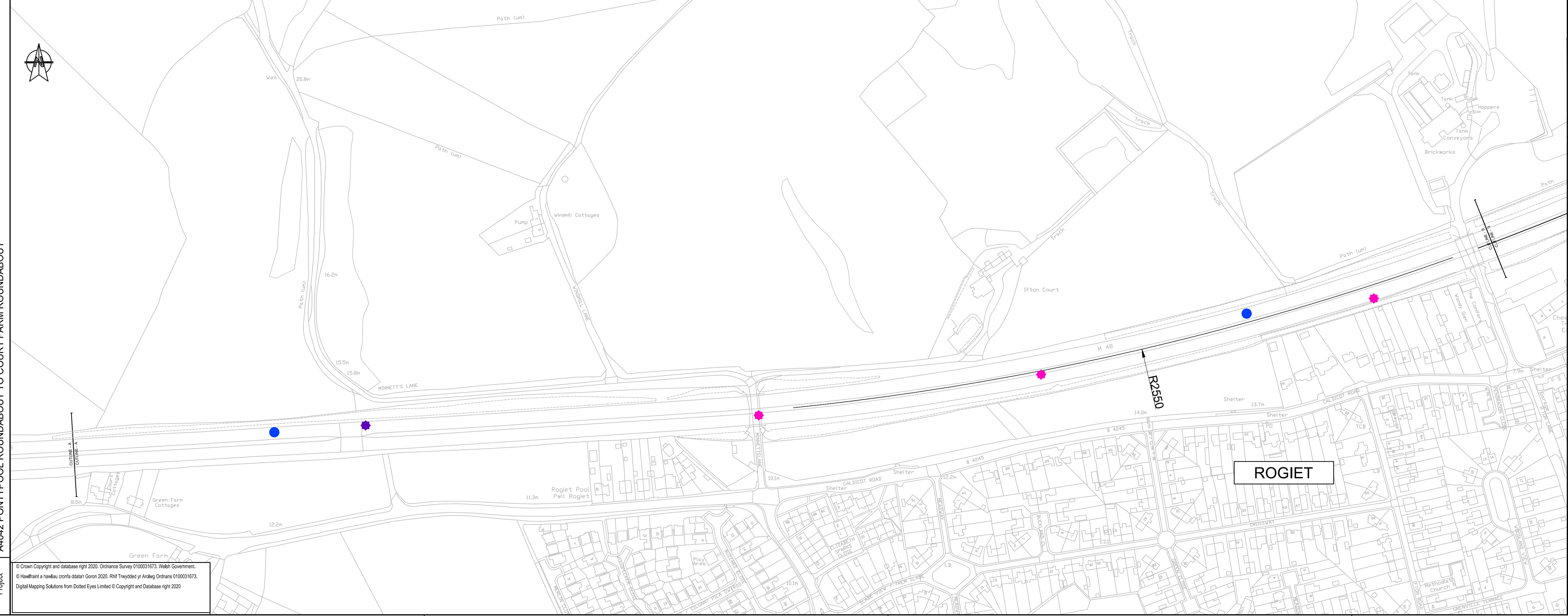
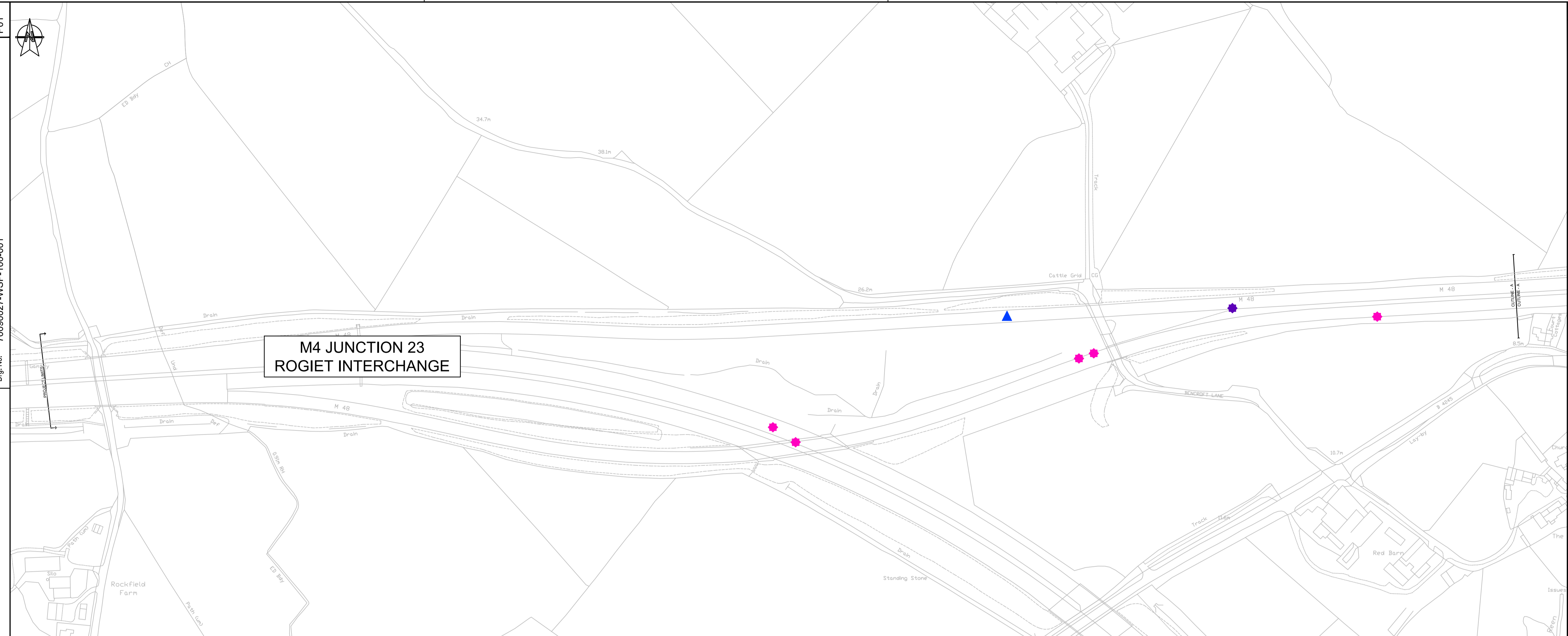
Operational Risk Assessment



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NOTES

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KEY

- ★ WESTBOUND BARRIER DEFECT
- WESTBOUND SERIOUS ACCIDENT
- WESTBOUND SLIGHT ACCIDENT
- ★ EASTBOUND BARRIER DEFECT
- ▲ EASTBOUND FATAL ACCIDENT
- EASTBOUND SLIGHT ACCIDENT
- RADIUS OF BEND (m)

P01	FIRST ISSUE	RE	JT	AJ	22/03/22
Rev	Details	Dr	Ch	Ap	Date



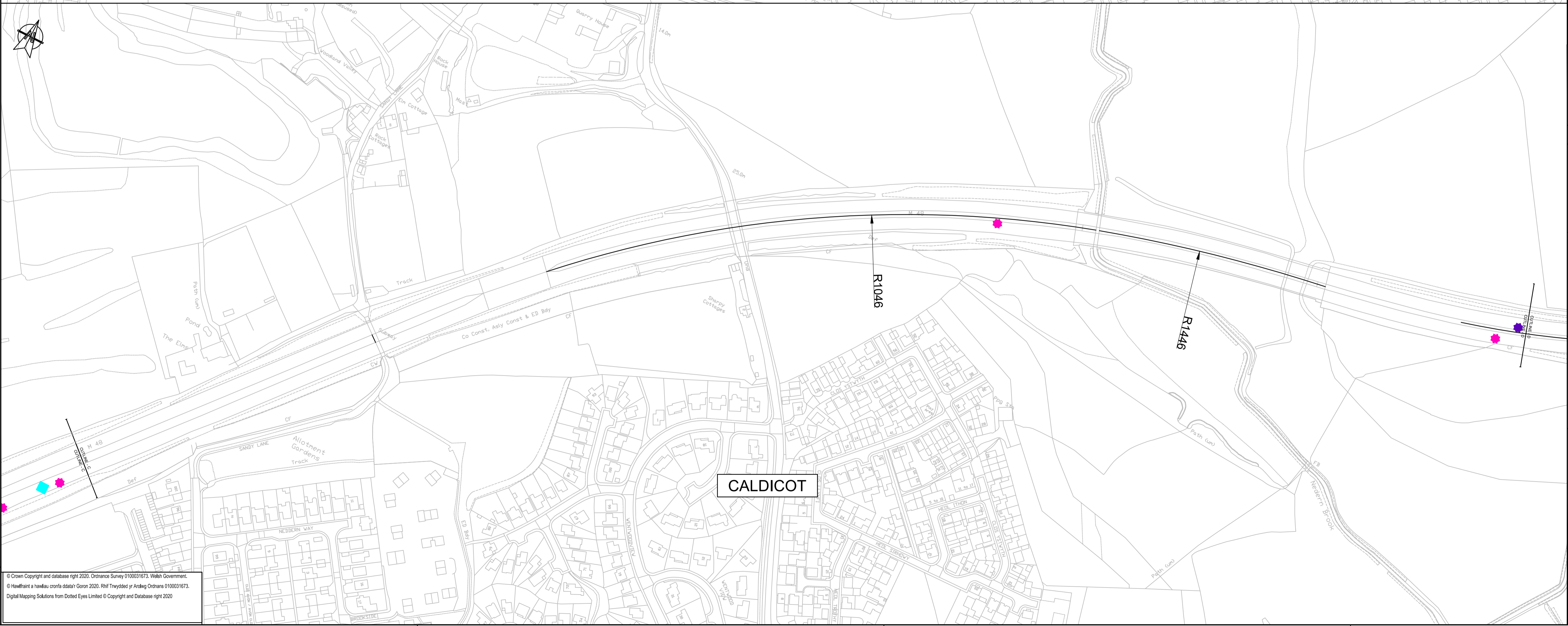
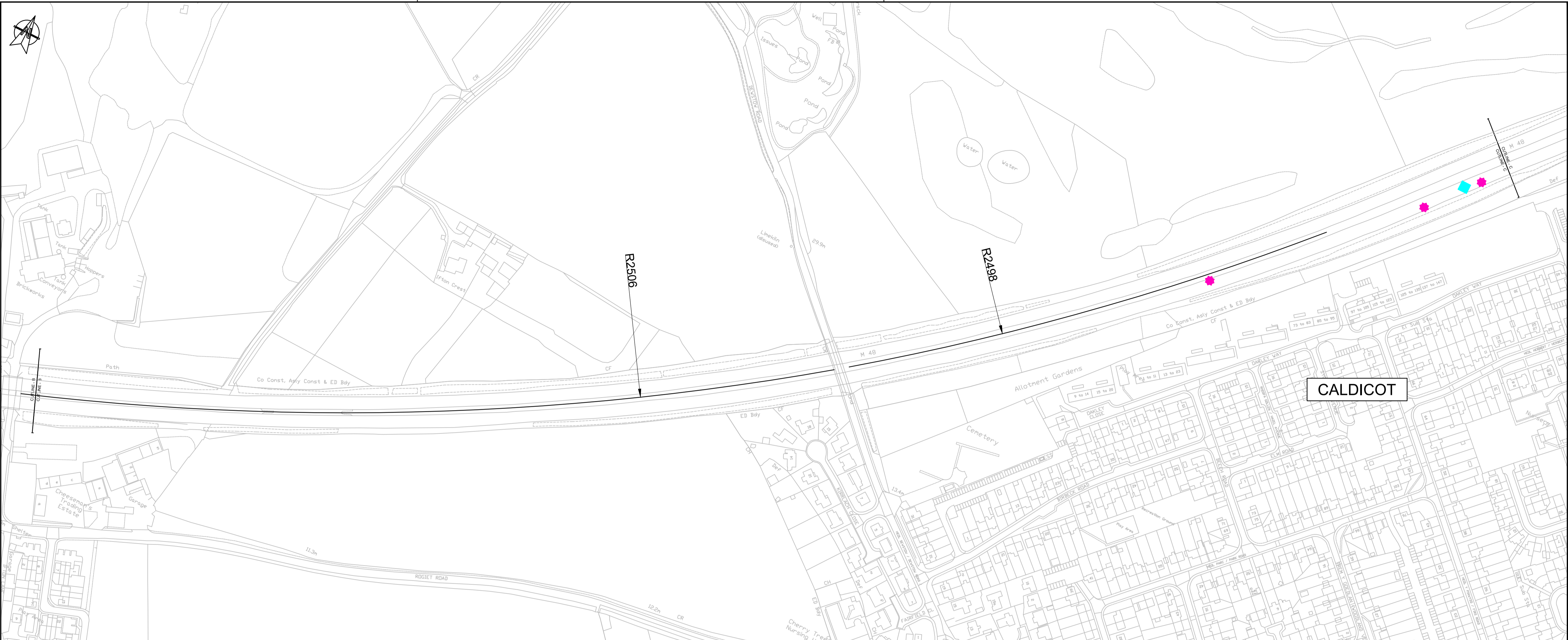
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Project
**M48 (EAST) CENTRAL AND VERGE
 BARRIER REVIEW
 M48 VEHICLE RESTRAINT SYSTEM REVIEW**
 SHEET 1 OF 5

File No.	70090027	Financial Code No.	21/SW/CSF/006
Drawn	RE	Checked	JT
Date	22/03/22	Date	22/03/22
Scale	1:2000	Approved	AJ
Date	22/03/22	Date	22/03/22
Scale	1:2000		
Drawing No.	70090027-WSP-100-001		P01



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P01	FIRST ISSUE	RE	JT	AJ	22/03/22
Rev	Details	Dr	Ch	Ap	Date



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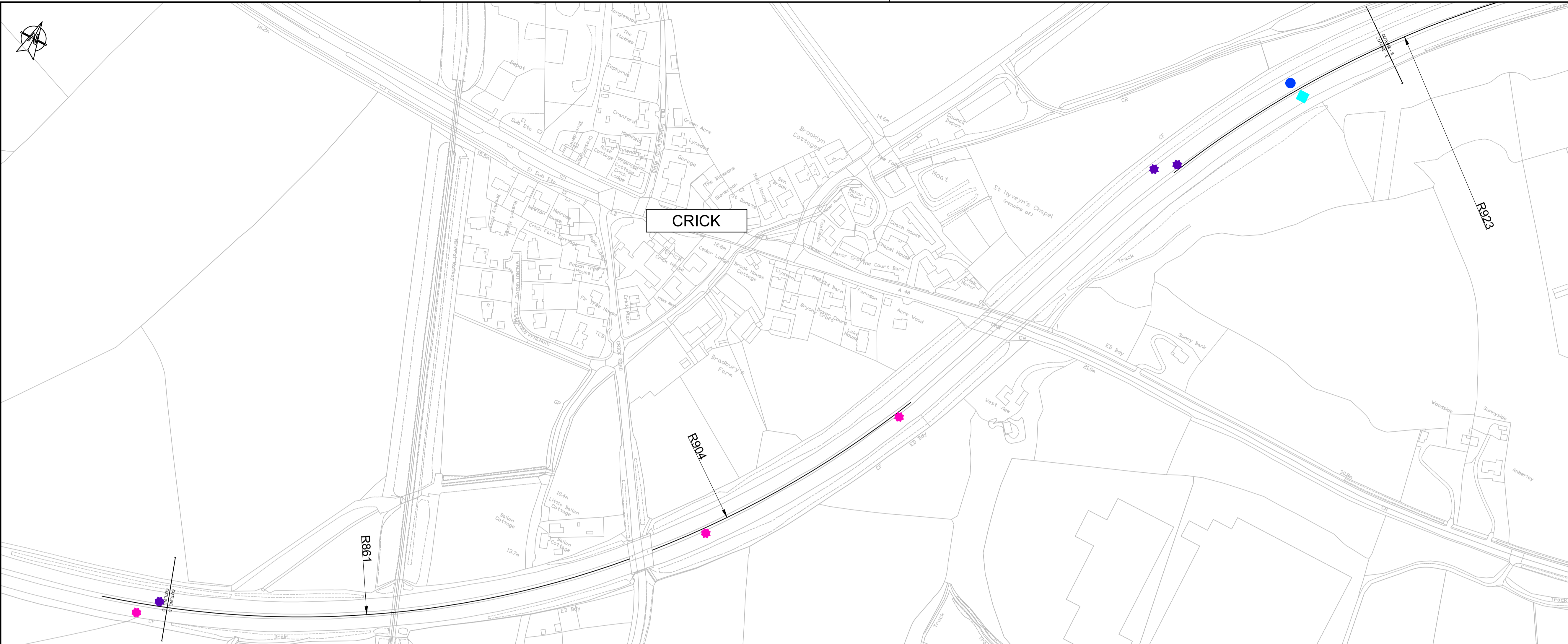


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SHEET 2 OF 5

File No.	70090027	Financial Code No.	21/SW/CSF/006
Drawn	RE	Checked	AJ
Date	22/03/22	Date	22/03/22
Scale	1:2000	Approved	JT
Date	22/03/22	Date	22/03/22
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- RXX RADIUS OF BEND (m)

P01	FIRST ISSUE	RE	JT	AJ	22/03/22
Rev	Details	Dr	Ch	Ap	Date



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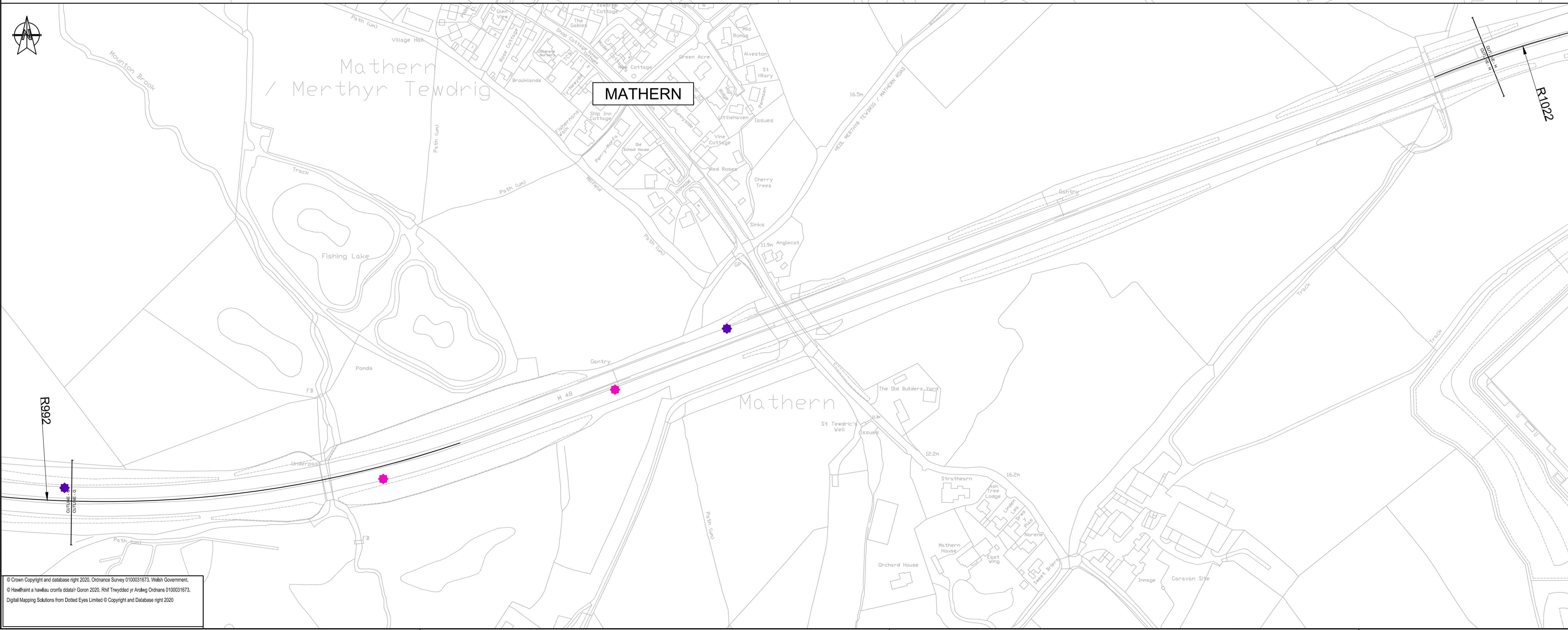
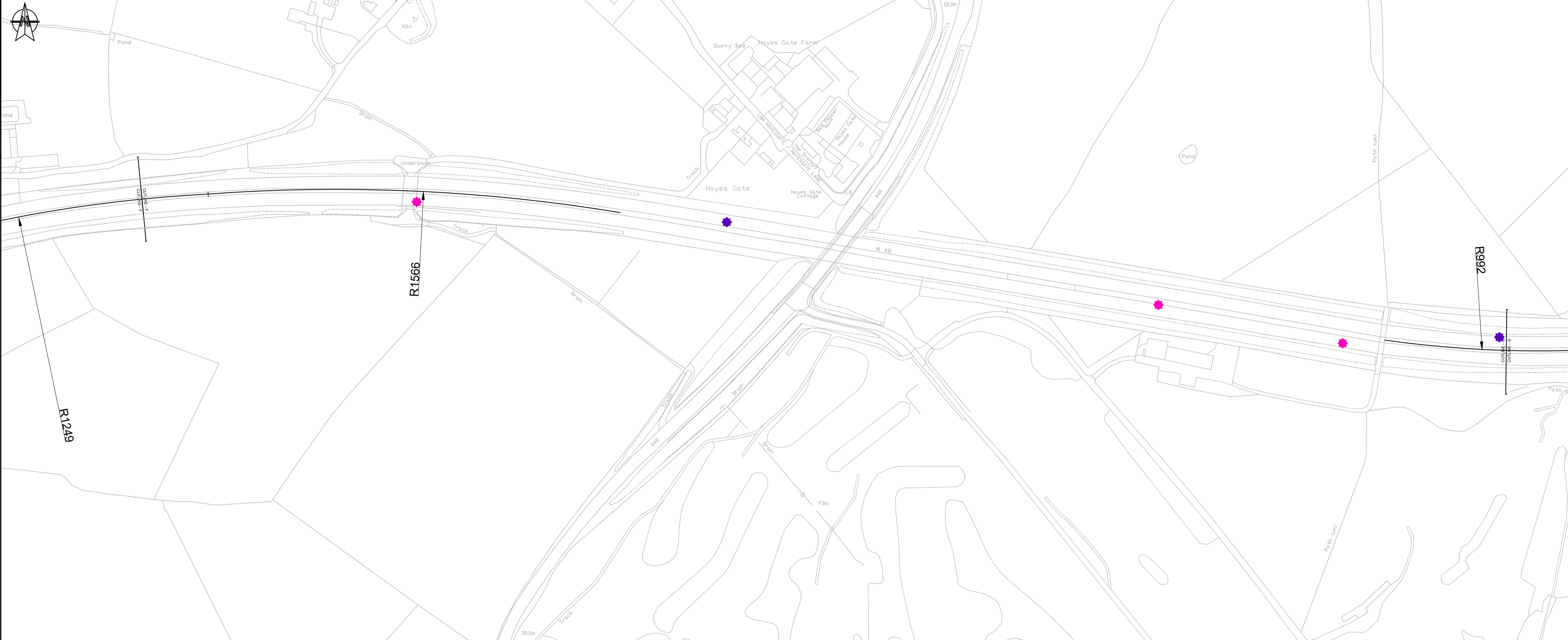


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M48 (EAST) CENTRAL AND VERGE
BARRIER REVIEW
M48 VEHICLE RESTRAINT SYSTEM REVIEW

SHEET 3 OF 5

File No.	70090027	Financial Code No.	21/SW/CSF/006
Drawn	RE	Checked	AJ
Date	22/03/22	Date	22/03/22
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Date	22/03/22	Date	22/03/22
Scale	1:2000		
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 - WESTBOUND SERIOUS ACCIDENT
 - WESTBOUND SLIGHT ACCIDENT
 - EASTBOUND BARRIER DEFECT
 - ▲ EASTBOUND FATAL ACCIDENT
 - EASTBOUND SLIGHT ACCIDENT
- RXX
 RADIUS OF BEND (m)

P01	FIRST ISSUE	RE	JT	AJ	22/03/22
Rev	Details	Dr	Ch	Ap	Date



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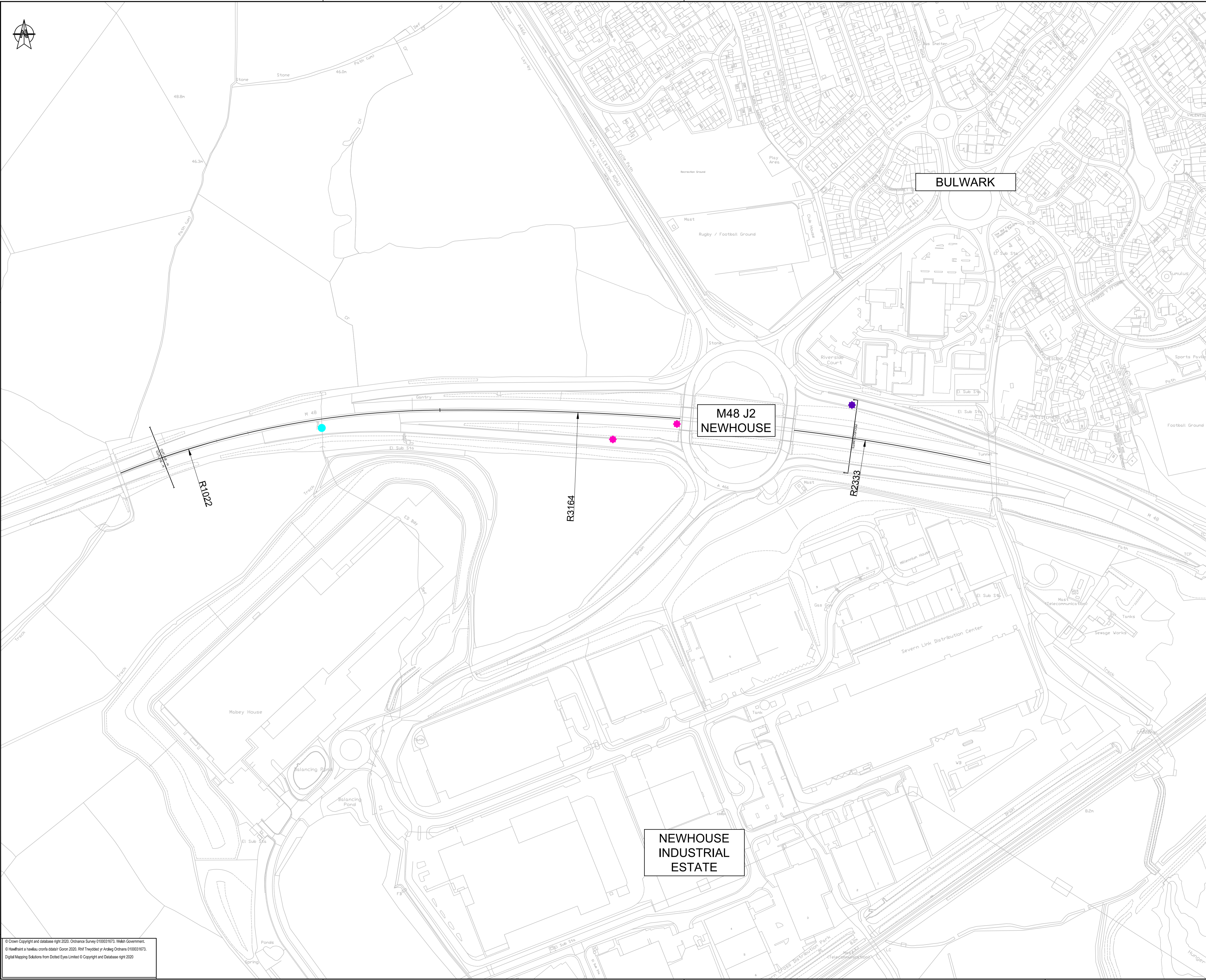
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**M48 (EAST) CENTRAL AND VERGE
 BARRIER REVIEW
 M48 VEHICLE RESTRAINT SYSTEM REVIEW**

SHEET 4 OF 5

File No.	70090027	Financial Code No.	21/SW/CSF/006		
Drawn	RE	Checked	AJ	Approved	JT
Date	22/03/22	Date	22/03/22	Date	22/03/22
Scales	1:2000				
Drawing No.	70090027-WSP-100-004				P01



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- EASTBOUND BARRIER DEFECT
- EASTBOUND FATAL ACCIDENT
- EASTBOUND SLIGHT ACCIDENT
- RADIUS OF BEND (m)

KEY TO HEALTH AND SAFETY SYMBOLS

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION.
- INDICATES A RESIDUAL RISK FOR INFORMATION.
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION.
- INDICATES A RESIDUAL RISK AS A WARNING.

P01	FIRST ISSUE	RE	JT	AJ	22/03/22
Rev	Details	Dr	Ch	Ap	Date



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Drawn	RE	Checked	AJ	Approved	JT
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Appendix D – Cat 1 Defect Records

M48 Central Reserve Safety Barrier Review

Operational Risk Assessment



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Road	Narr	XSP	Incident Date	Item Detail	Easting	Northing	Location	Comments	Repair Type	Req'd repair date	Repair Date
M48	?		26/05/2020 10:52:00	Accident damage	353362	191514	A466 Newhouse R/A BETWEEN EB ON AND WB OFF SLIP	2 LENGTHS + 3 UPRIGHTS IN MIDDLE OF RBT B/51650	Perm	02/06/2020 10:53:01	23/06/2020 00:00:
M48	0 - Right Outside Verge (including		28/12/2018 12:54:00	Accident damage	351849	191109	A/E B47355M48 WEST MP200/2	M48 WEST MP200/2 5 LEGS 4 BEAMS A/E B47355	Perm	04/01/2019 12:55:23	28/12/2018 12:57:
M48	4 - Lane 1 (hard shoulder on		15/04/2018 11:40:00	Accident damage	350591	191228	A/E B45483M48 WB Jct2 - 23 MP201/5, 15MTRS	RTC damaged verge and C/Res safety fence A/E B45483	Perm	02/08/2018 13:16:35	26/04/2018 00:00:
M48	4 - Lane 1 (hard shoulder on		18/03/2020 14:08:00	Accident damage	352152	191260	A/E B51295 M48 EAST NEARSIDE BARRIER JUST BEFORE MP 199/8	3 LENGTHS 3 UPRIGHTS DAMAGED DUE TO VEHICLE IMPACT(UNKNOWN)/A/E B51295	Perm	25/03/2020 14:08:07	13/05/2020 00:00:
M48	8 - Right Verge		16/02/2017 00:00:00	Accident damage	347260	188770	M48 WB CALDICOT MP 205/8 C/RES	RTC DAMAGED STONE RETAINING WALL C/RES	Perm	16/03/2017 00:00:00	22/03/2017 00:00:
M48	8 - Right Verge		02/07/2017 00:00:00	Accident damage	350008	191138	A/E B42526M48 WB MP 201/7 CRICK C/RES	APPROX 20M RTC DAMAGED C/RES SAFETY FENCE. A/E B42526	Perm	09/07/2017 00:00:00	07/07/2017 00:00:
M48	8 - Right Verge		26/02/2018 00:00:00	Accident damage	353437	191529	M48 WB MP 198/5 Under Newhouse interchange.	APPROX 6M RTC DAMAGED C/RES SAFETY FENCE.	Perm	05/03/2018 00:00:00	11/04/2018 00:00:
M48	8 - Right Verge		07/03/2018 08:49:00	Accident damage	353410	191602	A/E B44983 M48 W/BOUND BETWEEN SLIPS NEWHOUSE MP 198/5	MAKE SAFE ONLY	Perm	14/03/2018 08:49:00	07/03/2018 09:52:
M48	8 - Right Verge		13/04/2018 00:00:00	Accident damage	348527	189666	M48 WB CALDICOT MP 204.3	PLEASE NOTE RTC DAMAGED C/RES TCB, DAMAGED GULLY AND GOUGE IN C/WAY.	Perm	20/04/2018 00:00:00	24/04/2018 00:00:
M48	8 - Right Verge		23/05/2018 12:00:00	Accident damage	353434	191529	A/E B44847 M48 W/B MP198/2 Under Newhouse Interchange	Approx 6M RTC damaged C/Res safety fence	Perm	24/05/2018 12:00:00	11/04/2018 00:00:
M48	8 - Right Verge		30/06/2018 00:00:00	Accident damage	351420	191102	M48 WB ST PIERRE MP 200/6	20M RTC DAMAGED SAFETY FENCE.	Perm	07/07/2018 00:00:00	31/08/2018 00:00:
M48	8 - Right Verge		03/08/2018 00:00:00	Accident damage	347434	188964	M48 WB MP 205/5 CALDICOT SPLIT LEVEL.	20M RTC DAMAGED STONE RETAINING WALL.	Perm	31/08/2018 00:00:00	30/08/2018 00:00:
M48	8 - Right Verge		20/09/2018 00:00:00	Accident damage	346250	188153	M48 WB MP 207/1 ROGIET.	APPROX 15M C/RES SAFETY FENCE DAMAGE.	Perm	27/09/2018 00:00:00	01/01/9999 00:00:
M48	8 - Right Verge		17/10/2018 08:35:00	Accident damage	349158	190435	A/E B46711M48 EAST MP203/2	3 LEGS 3 BEAMS CENTRE RES DAMAGE A/E B46711	Perm	24/10/2018 08:36:11	25/10/2018 00:00:
M48	8 - Right Verge		10/11/2018 09:00:00	Accident damage	349176	190447	M48 EB J23 TO J2 mp 203/1	Central reservation safety fence damage	Perm	17/11/2018 09:00:00	20/11/2018 00:00:
M48	8 - Right Verge		17/10/2019 00:00:00	Accident damage	350869	191210	A/E B49519M48 EB ST PIERRE MP 201/2	APPROX 25M RTC DAMAGED C/RES TCB SAFETY FENCE. A/E B49519	Perm	24/10/2019 00:00:00	01/11/2019 00:00:
M48	8 - Right Verge		28/10/2019 16:40:22	Accident damage	345339	188036	M48 EB MP207/6B49621	?	Perm	04/11/2019 16:40:22	06/11/2019 00:00:
M48	8 - Right Verge		18/01/2020 00:00:00	Accident damage	344681	187947	A/E B50456M48 WB MP 208/7 NR JCT 23	20M RTC DAMAGED C/RES SAFETY FENCE. A/E B50456	Perm	25/01/2020 00:00:00	30/01/2020 00:00:
M48	8 - Right Verge		21/07/2020 10:35:00	Accident damage	344947	187991	A/E B52006M48 WB J2-M4 MP 208/4	3 LENGTH + 3 UPRIGHTS CENTRAL RES DAMAGE B/52006	Perm	28/07/2020 10:35:39	06/08/2020 00:00:
M48	8 - Right Verge		22/07/2020 10:00:00	Accident damage	348538	189697	A/E B52013M48 EB M4-J2 MP 204/2	2 LEENGHTS + 2 UPRIGHT CENTRAL RES B/52013	Perm	29/07/2020 10:00:16	18/08/2020 00:00:
M48	8 - Right Verge		22/07/2020 10:31:00	Accident damage	345697	188034	A/E B52015M48 WB J2-M4 MP 207/6	1 LENGTH +1 UPRIGHT CENTRAL RES DAMAGE B/52015	Perm	29/07/2020 10:31:58	07/08/2020 00:00:
M48	8 - Right Verge		01/08/2020 00:00:00	Accident damage	350679	191225	M48 WB MP 201/4 HAYES GATE CRICK	10M RTC SAFETY FENCE DAMG C/RES	Perm	08/08/2020 00:00:00	11/08/2020 00:00:
M48	8 - Right Verge		27/08/2020 00:00:00	Accident damage	352056	191192	M48 WB ST PIERRE MP 200/2 - 200/3	30M RTC DAMAGED TCB S/FENCE C/RES	Perm	03/09/2020 00:00:00	04/09/2020 00:00:
M48	8 - Right Verge		21/12/2020 17:56:53	Accident damage	344425	187866	M48 Westbound J2 to M4 J23 - Marker post 209/0	Central Res Barrier Damage - 2 lengths and 1 upright	Perm	28/12/2020 17:56:53	22/01/2021 00:00:
M48	8 - Right Verge		23/12/2020 10:56:57	Accident damage	349058	190130	M48 W/B J2-J23 Marker 206/5	Central res damage 10M TCB	Perm	30/12/2020 10:56:57	19/01/2021 00:00:
M48	8 - Right Verge		16/01/2021 08:05:48	Accident damage	345692	188046	M48 W/B J2 - J23Marker post 207/6	Central res damage 3 uprights 2 lengths 207/6 Drain completely removed at marker post 207/7	Perm	23/01/2021 08:05:48	02/02/2021 00:00:
M48	8 - Right Verge		04/02/2021 13:40:24	Accident damage	348082	189551	M48 WB J2 - M4 J23 m/p 204/7 + 40m	C/res barrier 4 beams / 2 posts IMS CS-210204-036	Perm	11/02/2021 13:40:24	12/02/2021 00:00:
M48	8 - Right Verge		10/04/2021 17:31:22	Accident damage	348952	189959	M48 WB Newhouse to J23 m/p 203/7	c/res barrier damage 9 posts 8 beams	Perm	17/04/2021 17:31:22	20/04/2021 00:00:
M48	8 - Right Verge		12/05/2021 11:17:22	Accident damage	344823	187974	M48 E/B	SF damage in c/res	Perm	19/05/2021 11:17:22	19/05/2021 12:00:
M48	8 - Right Verge		19/06/2021 14:36:51	Accident damage	344692	187959	M48 Westbound MP 208/6 Central Res	5 X Beams 4X Posts	Perm	26/06/2021 14:36:51	26/06/2021 12:00:
M48	8 - Right Verge		19/07/2021 10:54:21	Accident damage	351255	191136	M48 W/B J2 - J23 marker 200/8	3 uprights central res damage	Perm	26/07/2021 10:54:21	26/07/2021 12:00:
M48	8 - Right Verge		01/12/2021 14:12:02	Accident damage	353639	191556	M48 EB - J2 - MP 198/4 EAST BOUND ENTRY SLIP NEWHOUSE C/RES	8M C/RES OBB DAMG	Perm	08/12/2021 14:12:02	01/01/9999 00:00:
M48	Right Boundary		13/08/2018 11:10:00	Accident damage	351562	191107	A/E B46266M48 E/BOUND MP200/5 +20M	3 X SECTION LENGTHS 3 X UPRIGHT POSTS A/E B46266	Perm	20/08/2018 11:10:27	30/08/2018 00:00:
										14/02/2022	10:29:15

M48 Central Reserve Safety Barrier Review

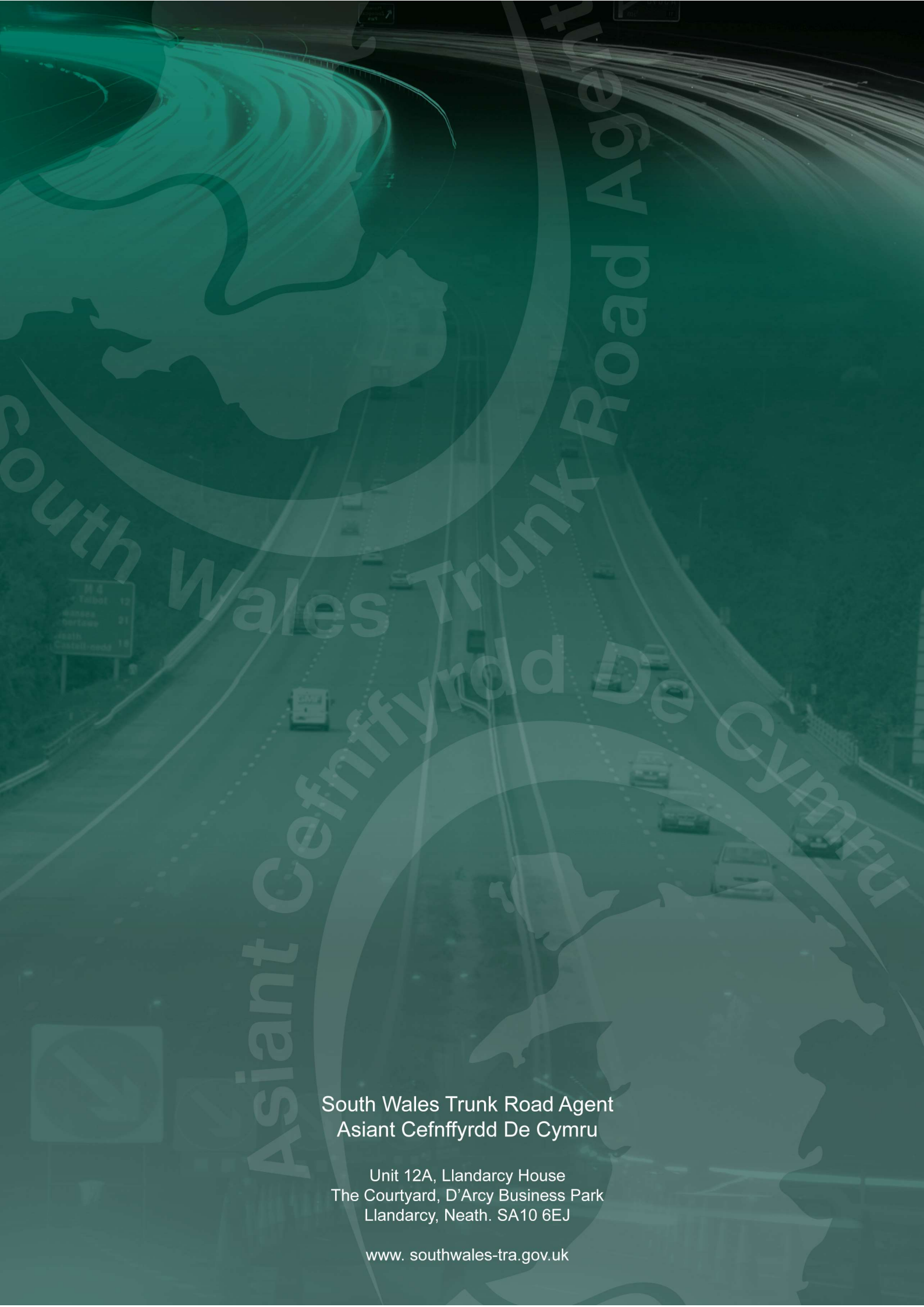
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