Rhondda Cynon Taf County Borough Council

A8066 Tynybryn River Channel Survey

Tynybryn River Channel

July 2020

Contents Amendment Record

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Inspection Information

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Report by:	Nicholas Tucker	
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Contents

1 Overview

Multiple structures were present along the inspected section of the Ely River Channel, including a concrete culvert (Tynybryn Culvert), Tynybryn Footbridge which links Tynybryn Road (on the west side of the A4119) with Park Place (on east side of the A4119) via a pedestrian underpass, with the river passing underneath the A4093 River Bridge at the downstream end of the survey area; approximately 250m downstream of the footbridge. The inspection of the River Channel started 100m upstream of Tynybryn Culvert at gird reference ST 00820 87723, and proceeded to the downstream training walls of the A4093 River bridge at grid reference ST 00625 87401, with a total inspected length of 413m; for a location plan, please refer to Appendix A.

Figure 1: General view of Tynybryn River Channel, viewed from the inspection start point

2 Objective

Edwards Diving Services Ltd. (EDS) was commissioned by Redstart on behalf of Rhondda Cynon Taf County Borough Council to carry out a survey of Tynybryn River Channel. The objective of the inspection was to carry out a conditional survey of the structures along Tynybryn River Channel and structural elements susceptible to scour. This report has been prepared in accordance with the CS 450 and the Inspection Manual for Highway Structures, 2007.

3 Access

Access to the watercourse was gained via the north east embankment, adjacent to Tynybryn Footbridge at grid reference ST 00733 87611. The inspection was undertaken by a qualified four-man team.

4 Site conditions

Weather conditions on the days of the inspection were dry and sunny. The flow within the river was low, enabling safe access to all elements of the structures.

5 Report

5.1 Structure details and general condition information

The chainage datum was taken from 100m upstream of Tynybryn Culvert at grid reference ST 00820 87723 (agreed starting point). The trundle wheel was run along the east side of the channel from north (upstream) to south (downstream). The structures and features identified during the inspection are detailed below in Table 5.1.

Note: The GPS device used to obtain the grid references stated an accuracy of +/- 6m.

Table 5.1: Structures and features encountered along the survey area, from north (upstream) to south (downstream) – Note: Photographs in the table below show the upstream view (left) and downstream view (right) for each structure/feature.

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.2.1	Concrete revetment	LHS (east)	ST 00820 87753 - ST 00783 87629	0m – 101.2m	The concrete revetment measures 0.95m in vertical height above a 0.3m high x 0.13m thick concrete toe, which is acting as scour protection. The total inspected length of the revetment was 100m where it joins the upstream elevation of Tynybryn Culvert.
					
5.2.2	Tynybryn Culvert	LHS (east)	ST 00783 87629 – ST 00746 87609	101.2m – 139.7m	The culvert consists of concrete sections in a trapezoidal shape measuring 3.8m high, 3.5m wide at the base and a maximum of 8m wide. The structure consists of 4 sections; the upstream section is on a skew and measures 10m long at the centre (8m on the LHS and 11.5m on the RHS looking downstream), with the other sections each measuring 9.6m long.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.2.3	Concrete revetment	LHS (east)	ST 00746 87609 – ST 00733 87606	139.7m – 156m	The concrete revetment measures 1.25m in vertical height above a 0.6m high x 0.35m thick concrete toe, which is acting as scour protection.
					
5.2.4	Tynybryn Footbridge, East abutment & training wall	LHS (east)	ST 00733 87606 – ST 00731 87592	156m – 165.4m	The bridge consists of a single span concrete deck supported on concrete abutments with a span of 9m. A gabion basket training wall extends downstream on the east side.
					
5.2.5	Earth Embankment	LHS (east)	ST 00731 87592 – ST 00727 87576	165.4m – 185.7m	A heavily vegetated natural earth embankment extends between these chainages.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.2.6	Gabion Basket Retaining Wall	LHS (east)	ST 00727 87576 – ST 00717 97568	185.7m – 192.7m	Gabion Basket Retaining Wall measuring 2.6m high.
					
5.2.7	Concrete Retaining Wall	LHS (east)	ST 00717 97568 – ST 00705 87529	192.7m – 246.6m	Concrete Retaining Wall measuring a maximum of 4.7m high. There are 100mm diameter weep holes spaced 3m apart along the length of the wall.
					
5.2.8	Earth Embankment	LHS (east)	ST 00705 87529 – ST 00689 87507	246.6m – 294m	A heavily vegetated natural earth embankment extends between these chainages.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.2.9	Concrete Revetment	LHS (east)	ST 00689 87507 – ST 00679 87463	294m – 320.5m	The concrete revetment measures 1.5m in vertical height above a 0.6m high x 0.35m thick concrete toe, which is acting as scour protection.
					
5.2.10	Concrete Retaining Wall & A4093 Bridge East abutment	LHS (east)	ST 00679 87463 - ST 00625 87401	320.5m – 413m	The retaining wall is constructed from concrete initially measuring 2.65m high, increasing to a maximum of 3.7m high at 377m chainage. The wall then gradually reduces in height to 2.4m high at 394.3m.
					
5.3.1	Concrete Revetment	RHS (west)	ST 00820 87753 – ST 00788 87637	0m – 84.3m	The concrete revetment measures 0.95m in vertical height above a 0.3m high x 0.13m thick concrete toe, which is acting as scour protection.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.3.2	Concrete Retaining Wall	RHS (west)	ST 00788 87637 – ST 00783 87629	84.3m – 101.2m	The retaining wall initially measures 1.35m high above a 0.8m high concrete revetment. The retaining wall increases in height to 3.2m at 101.2m chainage.
					
5.3.3	Tynybryn Culvert	RHS (west)	ST 00783 87629 – ST 00746 87609	101.2m – 139.7m	***Please refer to Section Ref. 5.2.2***
					
5.3.4	Concrete Revetment	RHS (west)	ST 00746 87609 – ST 00733 87606	139.7m – 156m	The concrete revetment measures 1.25m in vertical height above a 0.6m high x 0.35m thick concrete toe, which is acting as scour protection.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.3.5	Tynybryn Footbridge, West abutment & Training Wall	RHS (west)	ST 00733 87606 – ST 00731 87592	156m – 167m	The bridge consists of a single span concrete deck supported on concrete abutments with a span of 9m. A gabion basket training wall extends downstream of the bridge on the west side.
					
5.3.6	Rock Armour	RHS (west)	ST 00724 87596 – ST 00722 87586	167m – 180m	Rock armour retaining wall measuring 2.3m high.
					
5.3.7	Earth Embankment	RHS (west)	ST 00722 87586 – ST 00699 87528	180m – 246.6m	Natural earth embankment extending for 66.6m.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.3.8	Rock Armour	RHS (west)	ST 00699 87528 – ST 00685 87493	246.6m – 293m	Rock armour extending for 46.4m.
					
5.3.9	Concrete Revetment	RHS (west)	ST 00685 87493 – ST 00690 87486	293m – 304.5m	Concrete revetment measuring 1.3m in vertical height.
					
5.3.10	Earth Embankment	RHS (west)	ST 00690 87486 – ST 00680 87468	304.5m – 320.5m	Natural earth embankment extending for 16m.
					

Section Ref.	Structure / Feature	Riverbank (RHS or LHS, as looking downstream)	Grid Ref.	Chainage	Details
5.3.11	Concrete Retaining Wall	RHS (west)	ST 00680 87468 - ST 00618 87404	320.5m – 413m	Concrete retaining wall measuring up to 3.05m high.

5.2 Inspection findings – East Side

Photographs referenced within the tables below (see column entitled 'P') can be found embedded in the drawings provided in Appendix B. Severity (S), extent (Ex) and work required (W) codes can be found in Appendix E: Inspection reference tables; and numbered references in the "Ref." columns cross-refer to the numbered points in the Discussion and Recommendations sections of this report (see Sections 6 and 7 respectively).

5.2.1 Concrete Revetment (ST 00820 87753 – ST 00783 87629)

Chainage	Description	P	S	Ex	W	Ref.
-	The riverbed material consists of large loose stones. Multiple sections of concrete were present within the watercourse, indicating damage to the revetment upstream of the inspection start point. The riverbed is 3.2m wide at the start chainage.	3, 4	-	-	-	-
0m	Directly upstream of the inspection start point, the concrete toe is missing over a 3.8m length.	5	3	B	R	i.
0m – 101.2m	Large sections of the revetment are covered with heavy and dense vegetation including moss, Japanese Knotweed (from 67.4m) and trees which obscured the inspection of the revetment.	6, 7	2	E	RM	ii.
17.2m & 19.3m	There are two trees growing to the revetment measuring 180mm and 400mm in diameter, respectively. There are sections of loose and displaced concrete surrounding the trees both measuring 300mm high and 700mm long.	8, 9	2	E	RM	ii.
27.4m	There is a 150mm diameter concrete drainage pipe located 3.8m (vertically) above the base of the wall. The pipe was not flowing at the time of inspection. A concrete apron extends from the pipe outlet to the top of the wall measuring 5.3m long. There is an area of scour to the apron measuring 1m long, 0.18m wide and 0.13m deep. Due to the location of the scour, this is not significant at present.	10, 11	3	B	N	-
34.5m	A tree has fallen into the watercourse, measuring 180mm in diameter. The tree is not restricting the water flow at present.	12	2	B	RM	ii.
54.3m – 59.2m	The concrete toe has failed between these chainages. There are two 225mm diameter concrete drainage pipes at 55m. The upstream pipe is fully blocked, and the downstream pipe is partially blocked. Both pipes were dry at the time of inspection; water flow and orange coloured infiltration was present through the base of the wall adjacent to the pipes. This is located at grid reference ST00810 87667.	13 - 15	5	C	I	iii.

72.6m	There is a 150mm diameter steel drainage pipe located at the top of the revetment. A 1.85m wide concrete apron extends 2.8m from the drainage pipe. At the end of the apron, there is undercut measuring 0.25m high and 0.25m deep. Due to the location of the scour, this is not significant at present.	16, 17	2	B	N	-
80.5m – 93.3m	The revetment has failed, resulting in scour to the embankment measuring 2.3m high and up to 3m deep. This is located at grid reference ST 00797 87635.	18, 19	5	C	R	iv.
93.3m – 99.7m	There is a concrete invert extending upstream of Tynybryn Culvert. The invert is missing on the left side measuring 1.7m wide and up to 0.6m deep. This has resulted in undercutting of the revetment measuring 0.3m high and 0.5m deep, with a 1m long section of the concrete toe missing at 95m. The remaining concrete invert on the right side of the watercourse is undercut measuring 0.4m high and 0.5m deep. This is located at grid reference ST 00787 87631.	20 - 22	5	C	R	v.
100.6m	A section of the concrete toe is missing over a 0.6m length.	23	3	B	R	i.

5.2.2 Tynybryn Culvert (ST 00783 87629 – ST 00746 87609)

Chainage	Description	P	S	Ex	W	Ref.
-	The culvert was found to be in a good condition overall, with only minor defects identified.	24, 26	-	-	-	-
101.2m – 139.7m	There are 75mm diameter weep holes spaced 2m apart on both sides of the structure. There is white and green coloured infiltration coming from several of the weep holes.	25	2	C	N	-
110.3m	There is offensive graffiti present to the left side of the structure.	27	-	-	RM	vi.
129.4m	The jointing has come loose on the left side of the invert over a 1.2m length.	28	2	B	N	-

5.2.3 Concrete Revetment (ST 00746 87609 – ST 00733 87606)

Chainage	Description	P	S	Ex	W	Ref.
139.7m – 145.4m	The revetment has failed adjacent to the downstream elevation of Tynybryn Culvert resulting in scour to the embankment measuring 1.5m high and up to 1m deep.	30, 31	5	C	R	iv.
145.4m – 156m	The concrete toe is undercut initially measuring 0.15m high and 0.2m deep, increasing to a maximum of 0.4m high and 0.6m deep at 153.7m.	32, 33	3	C	R	v.

149.9m – 156m	There are multiple displaced sections of concrete measuring up to 0.9m long and 0.6m high. This is likely due to previous tree growth to the revetment. The trees have since been cut back and only the stumps remain.	34, 35	3	C	R	vii.
154m	There is a 100mm diameter plastic drainage pipe to the base of the revetment. The pipe was not flowing at the time of inspection.	-	1	A	-	-

5.2.4 Tynybryn Footbridge – East Abutment & Training Wall (ST 00733 87606 – ST 00731 87592)

Chainage	Description	P	S	Ex	W	Ref.
157m	There is concrete bagwork scour protection to the abutment measuring 1.1m high. The bagwork is undercut over an area measuring 0.6m long, 0.4m high and 0.4m deep. The east abutment is constructed from concrete and measures 1m high above a 0.15m high concrete toe. There is black and green staining to the abutment, which is in a generally good condition. No scour was identified to the abutment.	38 39	3 2	B D	R N	v. -
158.8m – 165.4m	Downstream of the footbridge the gabion basket training wall is in a poor condition and is leaning into the watercourse creating a void to the embankment behind measuring 0.7m high and 1m deep. At 163.4m the baskets are undercut over an area measuring 1.5m long, 0.8m high and 1.2m deep. Additionally, there are remnants of a previous concrete invert that extends from the downstream elevation of the footbridge to the end of the training wall. The failure of the concrete invert is likely to have caused undercutting of the adjacent gabion baskets.	40 - 42 43	4 5	E E	R R	viii. viii.

5.2.5 Earth Embankment (ST 00731 87592 – ST 00727 87576)

Chainage	Description	P	S	Ex	W	Ref.
165.4m – 185.7m	An earth embankment extends downstream of the training wall for a length of 20.3m. There is dense vegetation growth to the embankment; visible areas were in a good condition, with no signs of scour. The riverbed consists of loose stone extending downstream.	44	1	A	-	-

5.2.6 Gabion Basket Retaining Wall (ST 00727 87576 – ST 00717 87568)

Chainage	Description	P	S	Ex	W	Ref.
185.7m – 192.7m	The gabion baskets are in a poor condition, with multiple bulging and leaning baskets present. The baskets are undercut from 185.7m – 191.4m measuring 0.3m high and 0.25m deep.	45 - 47	3	E	R	viii.

5.2.7 Concrete Retaining Wall (ST 00717 87568 – ST 00705 87529)

Chainage	Description	P	S	Ex	W	Ref.
192.7m – 246.6m	The retaining wall was found to be in a good condition, with no scour identified. The wall has been subject to moss growth and overhanging vegetation.	48, 49	2	D	N	-
	From 208.8m chainage the base of the wall is protected by a 1.25m wide concrete apron. The apron was in a good condition, with no scour identified.	50	1	A	-	-

5.2.8 Earth Embankment (ST 00705 87529 – ST 00689 87489)

Chainage	Description	P	S	Ex	W	Ref.
246.6m – 294m	The visible areas of the embankment were found to be in a good condition, with no scour identified. There is heavy and dense vegetation growth to the embankment, including Japanese Knotweed which starts at 255m chainage.	51, 52	2	E	RM	ii.

5.2.9 Concrete Revetment (ST 00689 87489 – ST 00679 87463)

Chainage	Description	P	S	Ex	W	Ref.
296.1m – 306.4m	The revetment has failed resulting in scour to the embankment measuring 1.7m high and 1.5m deep. This is located at grid reference ST 00687 87481.	53	5	C	R	iv.
307.7m – 313.1m	There is a 0.25m wide concrete apron adjacent to the toe. The apron is undercut measuring 0.2m high and 0.3m deep indicating 0.05m penetration of the toe.	54	3	C	R	v.
313.1m – 320.5m	The revetment has failed causing scour to the embankment measuring 1.7m high and 0.7m deep.	55, 56	5	C	R	iv.

5.2.10 Concrete Retaining Wall & A4093 Bridge East Abutment (ST 00679 87463 - ST 00625 87401)

Chainage	Description	P	S	Ex	W	Ref.
320.5m	The upstream section of the retaining wall is protected by two gabion baskets. There is dense vegetation growth to the baskets, however they remain in a fair condition.	57	2	B	N	-
321.5m – 413m	The retaining wall was found to be in a generally good condition, with no scour identified. The wall has been subject to moss growth and overhanging vegetation, which are not causing any structural damage at present.	58, 59	2	D	N	-
321.5m – 413m	The bed material generally consists of loose stone. At 331.5m chainage a section of the failed revetment is present within the watercourse. Additionally, there is a small build-up of debris to the left side of the watercourse at 372.8m.	60, 61	2	B	N	-
379.9m – 413m	From 379.9m there is Japanese Knotweed growth to the base of the retaining wall.	62	2	D	RM	ii.
394.3m – 406.4m	The east bridge abutment measures 4.6m high and was found to be in a good condition, with no scour identified. The abutment is protected by a 1.75m wide x 1.05m high concrete apron which was also in good condition. The upstream elevation of the bridge is located at grid reference ST 00629 87421.	63	1	A	-	-
409m	There is a fractured 150mm diameter clay drainage pipe to the retaining wall.	64	2	B	N	-
413m	At the downstream end of the retaining wall, gabion baskets have failed leading to washout behind the wall measuring 0.8m long, 2.4m high and 0.6m deep.	65, 66	5	B	R	viii.

5.3 Inspection Findings – West side

5.3.1 Concrete Revetment (ST 00820 87753 – ST 00788 87637)

Chainage	Description	P	S	Ex	W	Ref.
0m – 84.3m	The revetment is covered with heavy and dense vegetation including Japanese Knotweed and large trees, which prevented a full inspection.	67, 68	2	E	RM	ii.
14m	There is a section of missing concrete measuring 0.9m long, 0.6m high and 0.2m deep.	69	3	B	R	vii.

5.3.2 Concrete Retaining Wall (ST 00788 87637 – ST 00783 87629)

Chainage	Description	P	S	Ex	W	Ref.
84.3m – 101.2m	The visible elements of the retaining wall were found to be in a good condition. No scour was identified. There are large areas of vegetation growth the retaining wall, which obscured the inspection.	70	2	E	RM	ii.
92.9m	There is a scour hole to the right side of the invert measuring 200mm in diameter and 50mm deep. The hole has been filled with loose stone.	71	2	B	R	v.

5.3.3 Tynybryn Culvert (ST 00783 87629 – ST 00746 87609)

Chainage	Description	P	S	Ex	W	Ref.
101.2m	At the upstream elevation there is an area of missing jointing to the right side of the invert measuring 400mm long, 60mm wide and 70mm deep.	72	2	B	N	-
139.7m	There is a 0.6m high concrete weir at the outlet. There is a small area of scour to the right side of the weir measuring 150mm long, 150mm high and 100mm deep.	73	2	B	N	-

5.3.4 Concrete Revetment (ST 00746 87609 – ST 00733 87606)

Chainage	Description	P	S	Ex	W	Ref.
139.7m – 143.7m	The revetment has failed resulting in scour to the embankment measuring 1.4m high and 0.6m deep.	74	5	D	R	iv.
144m – 147m	There is a 225mm diameter concrete drainage pipe. The revetment surrounding the drainage pipe is in a poor condition with large sections missing and displaced.	75	4	D	R	iv.

139.7m – ***158.8m***	The concrete toe is undercut measuring a maximum of 0.4m high and 0.8m deep; typically, 0.15m high and 0.3m deep. ***(This extends from Tynybryn Culvert outlet to the downstream elevation of Tynybryn footbridge)***	76, 77	3	C	R	v.
154m – 156m	The revetment has failed resulting in scour to the embankment measuring 1.7m high and 0.7m deep.	78	5	D	R	iv.

5.3.5 Tynybryn Footbridge – West Abutment & Training Wall (ST 00733 87606 – ST 00724 87596)

Chainage	Description	P	S	Ex	W	Ref.
156m – 158.8m	The west abutment was found to be in a good condition, with no scour identified. The abutment is protected by a concrete apron which is scoured at the downstream end over an area measuring 1.1m long, 0.07m high and 0.1m deep.	79	2	B	N	-
159m – 167m	A total of four gabion baskets have failed adjacent to the downstream elevation of the footbridge. The gabion baskets are supported by mass concrete which is undercut up to 0.85m high and 1m deep. The undercut penetrates the gabion baskets by up to 0.2m.	80, 81	5	C	R	viii.

5.3.6 Rock Armour (ST 00724 87596 – ST 00722 87586)

Chainage	Description	P	S	Ex	W	Ref.
167m – 169.1m	The rock armour has displaced from its original position resulting in scour to the embankment measuring 1.3m high and 0.6m deep.	82	3	C	R	ix.
174m – 180m	Displaced rock armour has caused scour to the earth embankment measuring 2.4m high and 1.6m deep.	83	3	D	R	ix.

5.3.7 Earth Embankment (ST 00722 87586 – ST 00699 87528)

Chainage	Description	P	S	Ex	W	Ref.
180m – 246.6m	There is heavy and dense vegetation growth to the embankment.	84	2	E	N	-
196m – 203.5m	The earth embankment is scoured measuring up to 1.2m high and 1.4m deep. The scour is undercutting multiple large trees.	85, 86	3	B	RM	ii.

5.3.8 Rock Armour (ST 00699 87528 – ST 00685 87493)

Chainage	Description	P	S	Ex	W	Ref.
246.6m – 280m	There is heavy and dense vegetation including Japanese Knotweed to the rock armour.	87	2	E	RM	ii.

275.8m	The rock armour has displaced leading to an area of scour measuring 2.7m long, 1.6m high and 2m deep. The area has exposed a 150mm diameter plastic drainage pipe.	88	3	C	R	ix.
283m	Several rocks have been displaced and are present within the watercourse.	89	3	C	R	ix.

5.3.9 Concrete Revetment (ST 00685 87493 – ST 00690 87486)

Chainage	Description	P	S	Ex	W	Ref.
293m – 304.5m	Large sections of the revetments are covered with dense vegetation including moss, nettles and trees which obscured the inspection of the revetment.	90	2	E	RM	ii.
300m	There is a section of missing concrete measuring 0.9m long, 0.6m high and 0.25m deep.	91	3	C	R	vii.

5.3.10 Earth Embankment (ST 00690 87486 – ST 00680 87468)

Chainage	Description	P	S	Ex	W	Ref.
317m	There is a section of concrete present to the embankment. The concrete measures 1.6m high, 2.5m long and 0.25m thick. Sections of concrete are also present within the watercourse adjacent to the embankment.	92	2	B	N	-

5.3.11 Concrete Retaining Wall (ST 00680 87468 - ST 00618 87404)

Chainage	Description	P	S	Ex	W	Ref.
320.5m – 413m	The retaining wall is in a generally good condition, with no scour identified. Small areas of moss growth were identified to the top of the wall.	93	2	C	N	-
320.5m	The upstream section of the retaining wall is protected by two gabion baskets. There is dense vegetation growth to the baskets, however they were found to be in a fair condition.	94	2	B	N	-
320.5m – 359.2m	There is an earth embankment present to the base of the wall, measuring up to 0.8m high and 2.3m wide. Vegetation including Japanese Knotweed and trees are growing from the embankment. The trees are not causing any structural damage to the wall at present.	95, 96	2	C	RM	ii.
332.1m	There is a 225mm diameter clay drainage pipe. The pipe is in good condition.	97	1	A	-	-
364.4m	There is a 225mm diameter clay drainage pipe. The pipe is in good condition.	98	1	A	-	-
368.3m	There is a 225mm diameter clay drainage pipe covered by a flap valve. Both are in good condition.	99	1	A	-	-

6 Discussion

The issues identified during the inspection which may require remedial work or other intervention are summarised in the table below.

Table 6.1: Summary of issues identified at the inspection

Ref.	Defect
i.	There are three areas where the concrete toe is missing adjacent to the base of the concrete revetment. The toes should be reinstalled to provide long term scour protection to the revetment.
ii.	Large areas of vegetation growth including moss, Japanese Knotweed and trees were identified along the river channel. The vegetation obscured the inspection of large sections of the walls/revetments. Additionally, the trees have potential to cause structural damage if not removed.
iii.	Two blocked drainage pipes were identified to the east concrete revetment (section 5.2.1). Moderate water flow and orange coloured infiltration was noted through the base of the revetment adjacent to the drainage pipes, which has resulted in the failure of the concrete toe.
iv.	There is a total of 7 sections where the concrete revetment has failed, which has resulted in scour to the embankment behind. The sections should be reinstated to prevent further scour, which would result in washout behind the downstream sections, ultimately leading to further failed sections of the revetment.
v.	Multiple areas of undercutting were identified to the revetment, footbridge scour protection and concrete invert upstream of Tynybryn Culvert. These areas should be reinstated to prevent them from deteriorating, potentially leading to destabilisation of the structures and a localised collapse.
vi.	Offensive graffiti was identified within Tynybryn Culvert on the left side. This should be removed.
vii.	Tree growth has caused displacement of large sections of concrete to the revetment in section 5.2.3. The displaced sections should be reinstated to prevent further deterioration of the revetment from occurring during periods of high rainfall. Two areas of missing concrete were identified to the revetment in sections 5.3.1 and 5.3.8. These areas should be repaired to prevent them from worsening and increasing in size, leading to higher repair costs.
viii.	There are multiple areas where the gabion basket walls are in a poor condition and have failed. An area of particular concern is directly downstream of Tynybryn footbridge where the gabion baskets on the east side are undercut and leaning into the watercourse. Multiple baskets on the west side have also failed. There are remnants of previous concrete invert downstream of the footbridge. The failure of the invert is likely to have caused undercutting of the gabion baskets.
ix.	Rock armour scour protection has become displaced in several areas, resulting in scour to the embankment behind. The rocks should be moved back to their original positions to prevent further scour to the embankments.

7 Recommendations

In order to maintain the integrity and functionality of the structure, and to minimise future repair and maintenance costs, remedial works could be carried out as summarised in *Table 7.1* below.

Table 7.1: Proposed Remedial Works/Actions

Reference	Suggested Remedial Work	Priority	Estimated Cost
i.	Reinstall the missing sections of concrete with a suitable material to match the existing.	Medium	£4,500
ii.	Remove vegetation and dispose of waste off site. A licensed waste disposal company should be employed to take away and dispose of the Japanese Knotweed.	Medium	£10,000
iii.	Investigate the source of water infiltration before undertaking remedial works.	High	-
iv.	Fill the void behind the revetment with a suitable backfill material and rebuild the revetment to match the existing. Alternatively, gabion baskets could be utilised to protect the embankments.	High	£35,000
v.	Remove all loose material, pump the areas dry and reinstate with mass concrete.	High	£35,000
vi.	Remove graffiti from Tynybryn Culvert.	Low	£1,250
vii.	Remove all loose material/displaced sections and replace with new to match the existing.	Medium	£5,000
viii.	Remove all failed gabion baskets and replace with new. Consideration should be taken into installing a concrete invert which extends from the downstream elevation of Tynybryn Footbridge to the end of the training walls.	High	£25,000
ix.	Re-position displaced rocks to prevent further scour to the embankments.	Medium	£7,500

*Notes: *Routine maintenance items costed as £1, in accordance with the guidance contained in the Welsh Government Inspection Manual, Part D7.*

Appendix A: Structure location plan

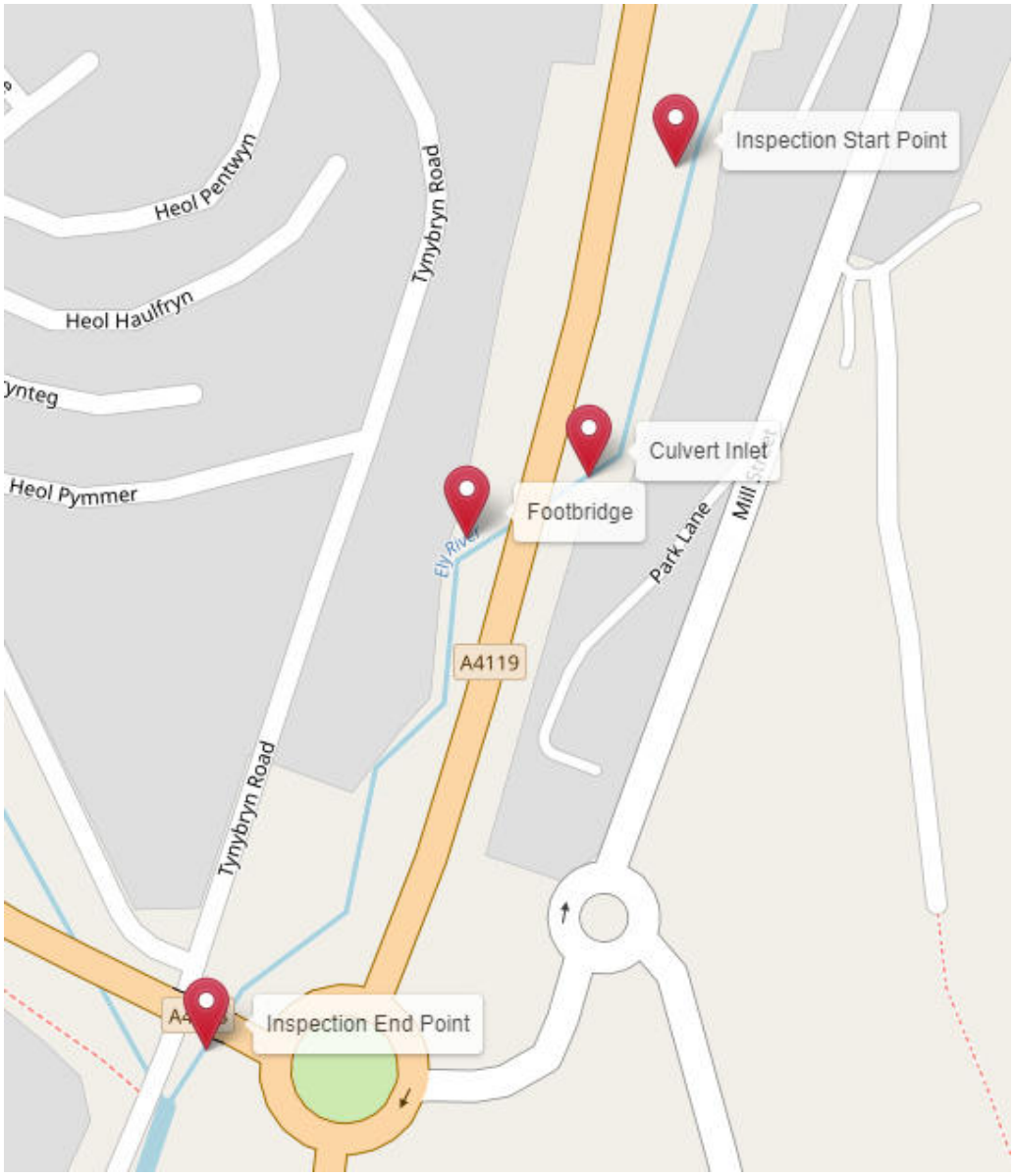


Figure A.1: Tynybryn River Channel Location Plan
Grid Ref: ST 00820 87753 (start) - ST 00625 87401 (end)

Appendix B: Inspection photographs

Photo 1 – General view of the river channel, viewed from the inspection start point

Photo 2 – View upstream of the inspection start point

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

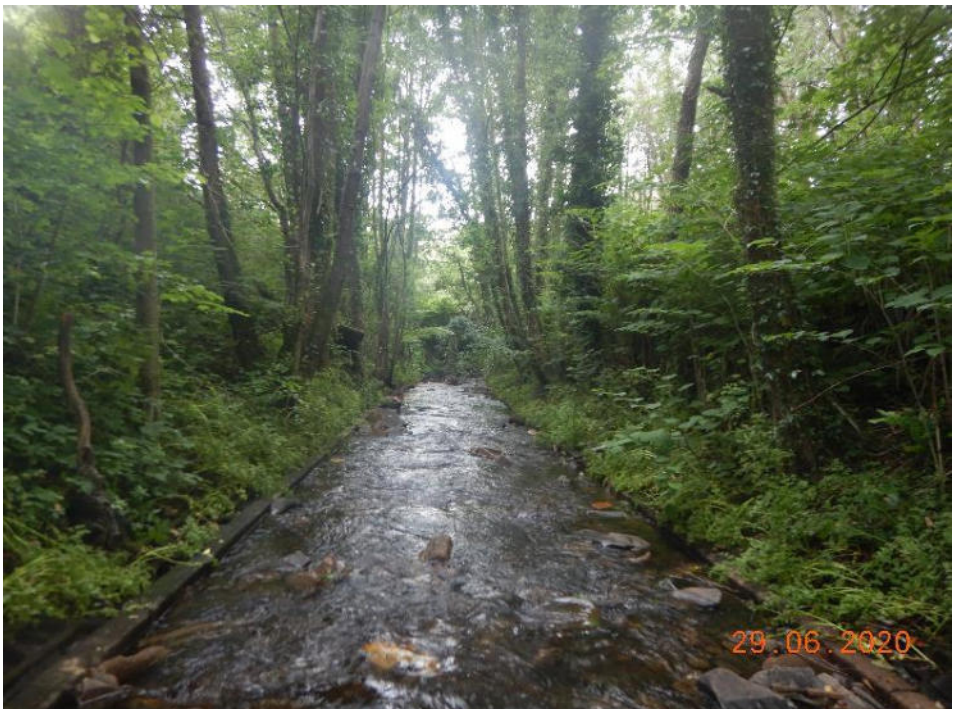


Photo 3 – General view of the riverbed (0m – 101.2m)

Photo 4 – Sections of the revetment present in the watercourse (0m – 101.2m)

Photo 5 – Missing concrete toe directly upstream of the inspection start point

Photo 6 – Vegetation growth to the revetment (0m – 101.2m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 7 – Japanese Knotweed growing on the revetment (0m – 101.2m)

Photo 8 – Tree growth causing displacement of concrete (17.2m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 9 – Tree growth causing displacement of concrete (19.3m)

Photo 10 – Drainage pipe (27.4m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 11 – Scour to the concrete apron (27.4m)

Photo 12 – Fallen tree (34.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 13 – Failed concrete toe (54.3m – 59.2m)

Photo 14 – Fully blocked concrete pipe (55m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 15 – Water flow through the base of the wall (55m)

Photo 16 – Steel drainage pipe (72.6m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 17 – Undercut to concrete apron (72.6m)

Photo 18 – Failed revetment resulting in scour to the embankment (80.5m – 93.3m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 19 – Failed revetment resulting in scour to the embankment (80.5m – 93.3m)

Photo 20 – Missing concrete invert (93.3m – 99.7m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 21 – Undercutting to the revetment (93.3m – 99.7m)

Photo 22 – Undercutting to the right side of the invert (93.3m – 99.7m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 23 – Missing concrete toe (100.6m)

Photo 24 – Upstream elevation of Tynybryn Culvert (101.2m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 25 – White and green coloured infiltration (101.2m – 139.7m)

Photo 26 – General view through the culvert, viewed looking downstream

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

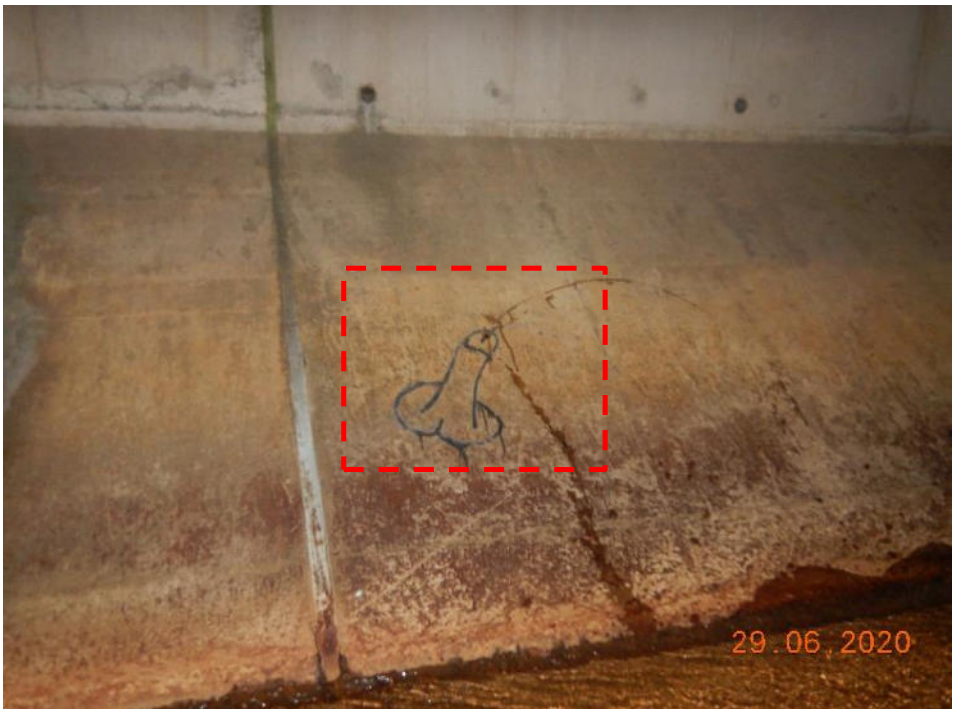


Photo 27 – Location of offensive graffiti (110.3m)

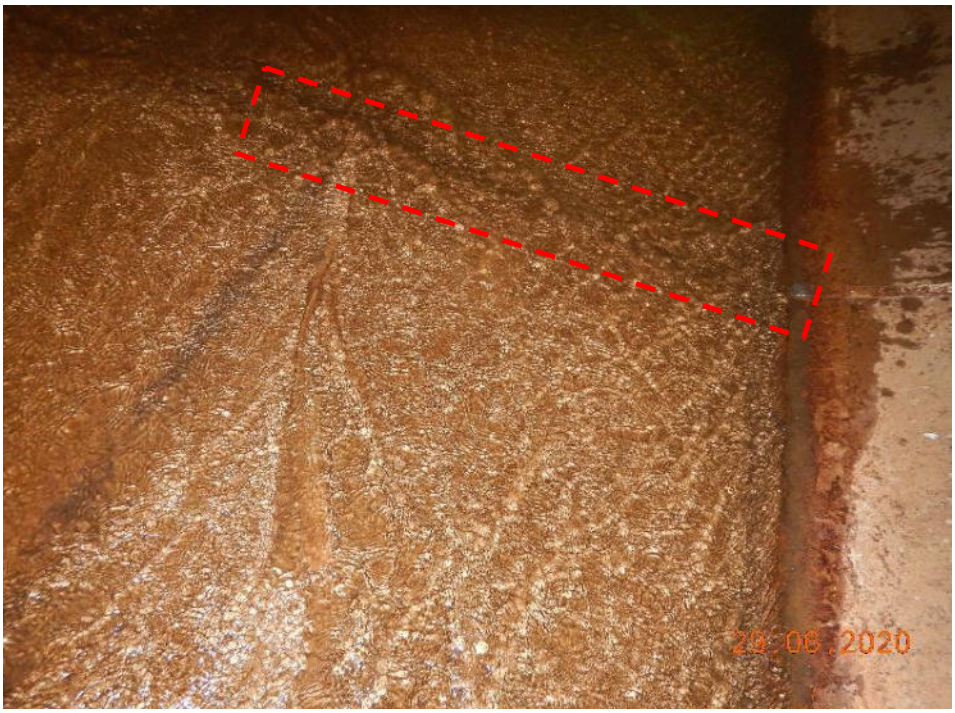


Photo 28 – Loose jointing (129.4m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 29 – Downstream elevation of Tynybryn Culvert

Photo 30 – Failed revetment (139.7m – 145.4m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 31 – Failed revetment (139.7m – 145.4m)

Photo 32 – Scour to the concrete toe (145.4m – 156m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 33 – Undercutting to the concrete toe (145.4m – 156m)

Photo 34 – Displaced concrete (149.9m – 156.6m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 35 – Displaced concrete and tree stumps (149.9m – 156m)

Photo 36 – Upstream elevation of Tynybryn Footbridge

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 37 – Downstream elevation of Tynybryn Footbridge

Photo 38 – Scour to concrete bagwork (157m)

Photo 39 – General view of the east abutment of Tynybryn Footbridge

Photo 40 – Condition of the gabion basket training wall (158.8m – 165.4m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 41 – Undercutting to the gabion basket training wall (163.4m)

Photo 42 – Void behind the gabion basket training wall (165.4m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 43 – Remnants of a concrete invert downstream of the footbridge

Photo 44 – Earth embankment (165.4m – 185.7m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 45 – General view of the gabion basket retaining wall (185.7m – 192.7m)

Photo 46 – Bulging and leaning baskets (185.7m – 192.7m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 47 – Undercutting to gabion baskets (185.7m – 192.7m)

Photo 48 – General view of the concrete retaining wall (192.7m – 246.6m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 49 – General view of the concrete retaining wall (192.7m – 246.6m)

Photo 50 – Concrete apron to the base of the retaining wall (208.8m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 51 – Vegetation growth to embankment (246.6m – 294m)

Photo 52 – Japanese Knotweed growth to the embankment (246.6m – 294m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 53 – Failed revetment (296.1m – 306.4m)

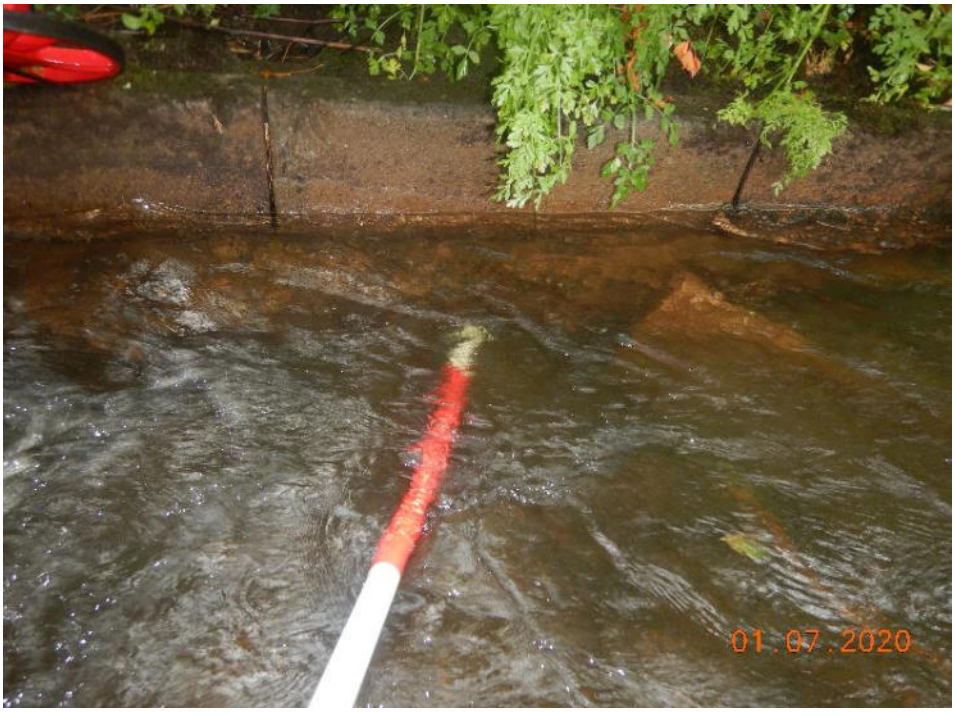


Photo 54 – Undercut to concrete toe (307.7m – 313.1m)

Photo 55 – Failed revetment (313.1m – 320.5m)

Photo 56 – Failed revetment resulting in scour to the embankment (313.1m – 320.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 57 – Dense vegetation growth to gabion baskets (320.5m)

Photo 58 – General view of the concrete retaining wall (321.5m – 413m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 59 – General view of the concrete retaining wall (321.5m – 413m)

Photo 60 – Section of concrete revetment in the watercourse (331.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 61 – Build-up of debris to the left side of the watercourse (372.8m)

Photo 62 – Japanese Knotweed growth (379.9m – 413m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 63 – General view of the east abutment (394.3m – 406.4m)

Photo 64 – Clay drainage pipe (409m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 65 – Failed gabion baskets (413m)

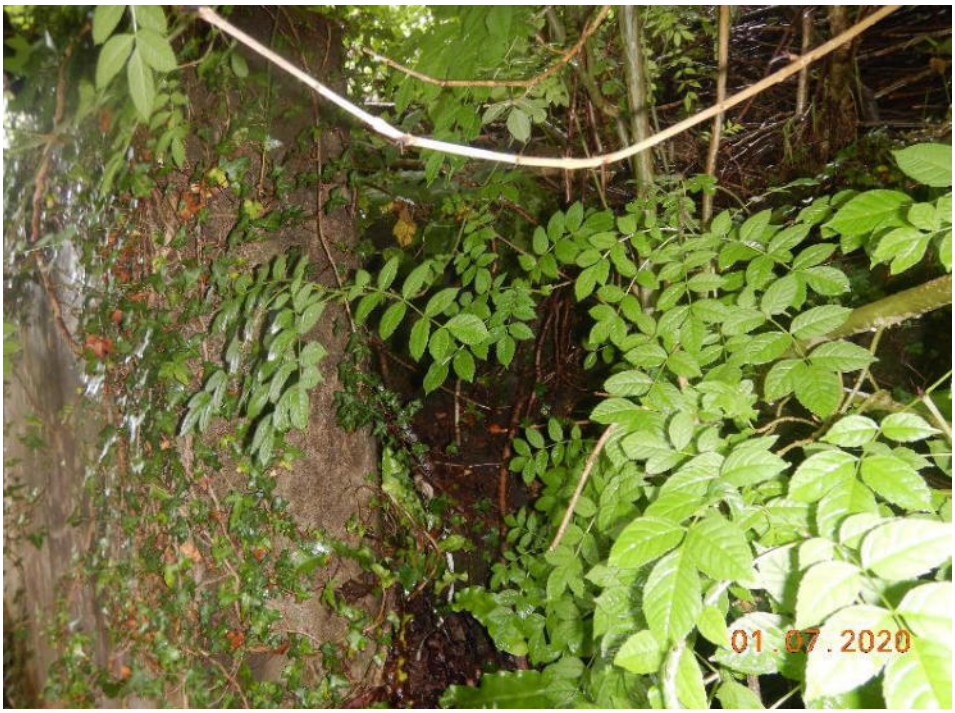


Photo 66 – Washout behind retaining wall (413m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 67 – Vegetation growth to the west revetment (0m – 84.3m)

Photo 68 – Vegetation growth to the west revetment (0m – 84.3m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 69 – Missing concrete to the west revetment (14m)

Photo 70 – General view of the concrete retaining wall (84.3m – 101.2m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 71 – Scour hole to the right side of the invert (92.9m)

Photo 72 – Missing jointing (101.2m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 73 – Location of scour to the weir (139.7m)

Photo 74 – Failed revetment resulting in embankment scour (139.7m – 143.7m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 75 – Missing and displaced concrete surrounding a drainage pipe (144m – 147m)

Photo 76 – Undercut to concrete toe (139.7m – 158.8m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 77 – Undercut to concrete toe (139.7m – 158.8m)

Photo 78 – Failed revetment (154m – 156m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 79 – Tynybryn footbridge west abutment (156m – 158.8m)

Photo 80 – Failed gabion baskets (159m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 81 – Undercut to mass concrete supporting gabion baskets (159m – 167m)

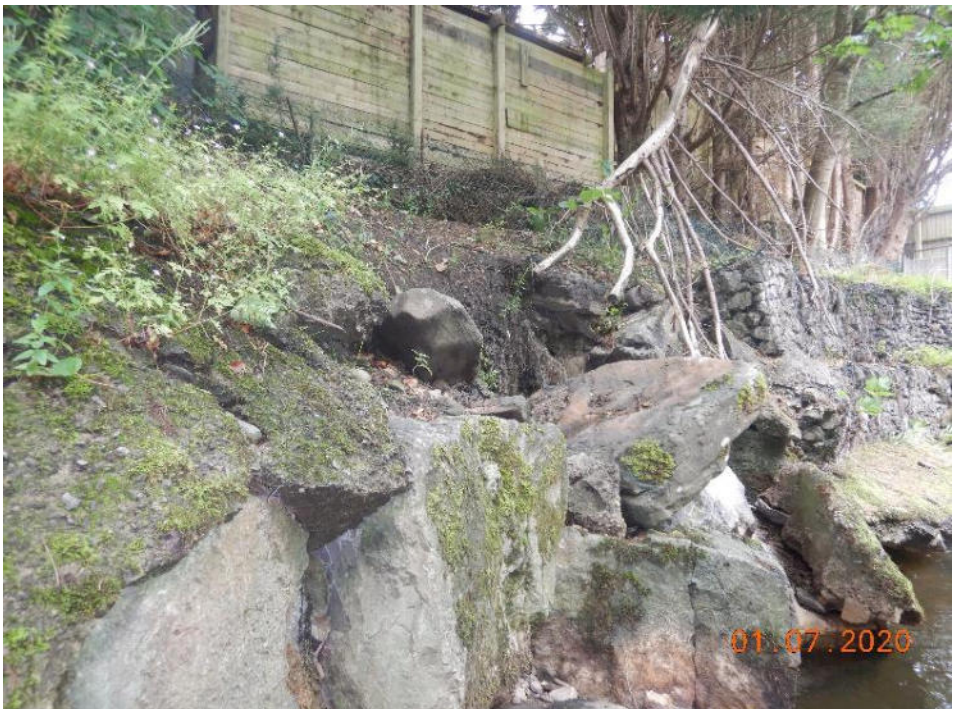


Photo 82 – Displaced rock armour causing embankment scour (167m – 169.1m)

Photo 83 – Scour caused by displaced rock armour (174m – 180m)

Photo 84 – Vegetation growth to the embankment (180m – 246.6m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 85 – Scour undercutting a large tree (196m – 203.5m)

Photo 86 – Scour to the embankment (196m – 203.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 87 – Dense vegetation growth to rock armour (246.6m – 280m)

Photo 88 – Displaced rock armour exposing a plastic drainage pipe (275.8m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 89 – Displaced rock armour (283m)

Photo 90 – Vegetation growth to the revetment (293m – 304.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	E·D·S MARINE & CIVIL ENGINEERING CONTRACTORS
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 91 – Section of missing concrete to the revetment (300m)

Photo 92 – Section of concrete present to the embankment (317m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 93 – General view of the concrete retaining wall (320.5m – 413m)

Photo 94 – Condition of gabion baskets (320.5m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 95 – Tree growing to the embankment (320.5m – 359.2m)

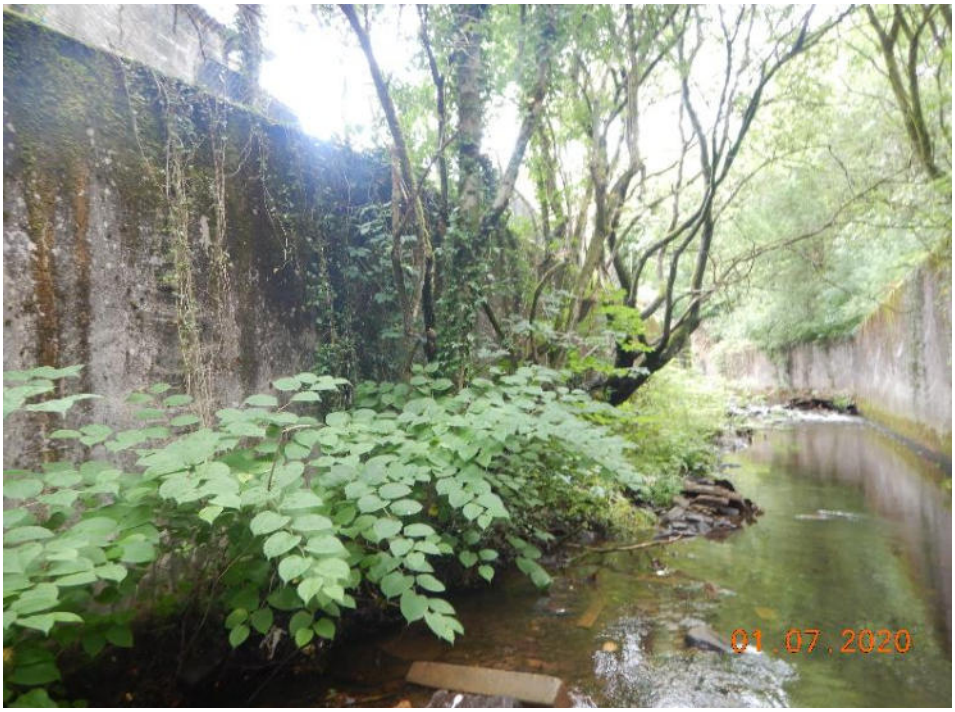


Photo 96 – Trees and Japanese Knotweed growing to the embankment (320.5m – 359.2m)

Job No.	A8066	Scheme Title	Tynybryn River Channel Survey	
Structure No.	-	Structure Name	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	Lead Inspector	N.Tucker	

Photo 97 – Clay drainage pipe (332.1m)

Photo 98 – Clay drainage pipe (364.4m)

Job No.	A8066	**Scheme Title**	Tynybryn River Channel Survey	
Structure No.	-	**Structure Name**	Tynybryn River Channel	
Date of Inspection	29/06/2020 & 01/07/2020	**Lead Inspector**	N.Tucker	

Photo 99 – Clay drainage pipe (368.3m)

Appendix C: BCI Inspection Proformas

Inspection type:	Special	Inspector:	N.Tucker	Form number:	1 of 21
Ret. Wall Name:	-			Date:	29/06/2020
Ret. Wall Ref.:	5.2.1	Avg. height:	1.25 (m)	Map Ref.:	ST 00820 87753
Panel Number:	- Max. height: 1.25	Panel length:	101.2 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	East Concrete Revetment			Primary Wall Material (Table G.15)	RA
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	5	C	7.1	R	H	TBC	✓	Revetment collapsed causing scour to embankment.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage	5	C	8.1	I	H	-		2 x blocked drainage pipes. Water flowing through revetment adjacent to pipes.
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	4	C	7.1	R	H	See 2		Scour to embankment due to failed revetment.
	16	Invert / River Bed	5	C	7.1	R	H	£35,000	✓	Failed invert causing undercutting of revetment.
	17	Aprons	5	C	7.1	R	M	£4,500	✓	Concrete toe failed and missing in areas.
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
2	2	2	E	5.1	RM	-	£1	Tree growth causing displaced concrete.
2	3	2	E	5.2	RM	-	£1	Vegetation growth including Knotweed obscuring inspection.
16	2	2	B	7.2	RM	-	£1	Tree fallen across watercourse.
17	2	3	B	7.1	N	-	-	2 x areas of scour to drainage pipe aprons.

Inspector's Comments

The following defects require remedial action:
- There are three areas where the concrete toe is missing adjacent to the base of the concrete revetment. The toes should be reinstalled to provide long term scour protection to the revetment.
- Large areas of vegetation growth including moss, Japanese Knotweed and trees were identified along the river channel. The vegetation obscured the inspection of large sections of the walls/revetments. Additionally, the trees have potential to cause structural damage if not removed.
- Two blocked drainage pipes were identified to the east concrete revetment (section 5.2.1). Moderate water flow and orange coloured infiltration was noted through the base of the revetment adjacent to the drainage pipes, which has resulted in the failure of the concrete toe.
- The revetment has failed, resulting in scour to the embankment behind. The section should be reinstated to prevent further scour, which would result in washout behind the downstream section, ultimately leading to further failed sections of the revetment.
- Undercutting was identified to the revetment adjacent to the failed concrete invert. This should be repaired to prevent the area from incraseing in size, resulting in a localised collapse.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Fill the void behind the revetment with a suitable backfill material and rebuild the revetment to match the existing. Alternatively, gabion baskets could be utilised to protect the embankments.	High	TBC
2, 16	Remove vegetation and dispose of waste off site. A specialist contractor should be employed to safely remove the Japanese Knotweed.	-	£1
5	Investigate the source of water infiltration before undertaking remedial works.	High	-
16	Remove all loose material, pump the areas dry and reinstate with mass concrete.	High	£35,000
17	Reinstall the missing sections of concrete with a suitable material to match the existing.	Medium	£4,500

Inspection type:	Special	Inspector:	N.Tucker	Form number:	2 of 21
Culvert Name:	Tynybryn Culvert			Date:	29/06/2020
Culvert Ref.:	5.2.2	Span width (m):	8	Map Ref.:	ST 00783 87629
Span Number:	1	Span length (m):	38.5	Primary Deck Form (Table G.4)	19
Span Description:	Trapezoidal shaped precast concrete sections			Primary Deck Material (Table G.6)	A
All above ground elements inspected:	No	Photographs:	Yes	Secondary Deck Form (Table G.5)	20
Number of construction forms in bridge/span:			1	Secondary Deck Material (Table G.6)	P

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
N/A	BCI av.	N/A	BCS av.	N/A	BCI av. -	BCS av. -
	BCI crit.	N/A	BCS crit.	N/A	BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Deck Elements	1	Primary Deck Element	-	-	-	-	RM	£1		Offensive graffiti present to left side.
	2	Transverse Beams								
	3	Secondary Deck Element								
	4	Half Joints								
	5	Tie Beams/Rods								
	6	Parapet Beam or Cantilever								
	7	Deck Bracing								
Load Bearing Substructure	8	Foundations								
	9	Abutments (Incl. Arch Springing								
	10	Spandrel Wall / Head Wall								
	11	Pier / Column								
	12	Cross-head / Capping Beam								
	13	Bearings								
	14	Bearing Plinth / Shelf								
Durability Elements	15	Superstructure Drainage	1	A						Good condition.
	16	Substructure Drainage								
	17	Waterproofing	2	C	14.1	N	-	-		White and green coloured infilration.
	18	Movement / Expansion Joints	2	B		N	-	-		Missing and loose jointing to invert.
	19	Painting: Deck Elements								
	20	Surface Finishes: Superstructure								
	21	Surface Finishes: Substructure								
	22	Painting: Parapets / Safety Fences								
Safety Elements	23	Access / Walkways / Gantries								
	24	Handrail / Parapets / Safety Fences	NI							
	25	Carriageway Surfacing								
	26	Footway / Verge / Footbridge Surface	NI							
Other Bridge Elements	27	Invert / River Bed	1	A						Good condition.
	28	Aprons								
	29	Fenders / Cutwaters / Collision Defense								
	30	River Training Works								
	31	Revetment / Batter Paving								
	32	Wing Walls								

	33	Retaining Walls								
	34	Embankments								
	35	Machinery								
Ancillary Elements	36	Approach Rails / Barriers / Walls								
	37	Signs								
	38	Lighting								
	39	Services								
Other Deck Elements	40	Trash Screens								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The culvert was found to be in a good condition overall, with only a few minor defects identified.
The offsensive graffiti should be removed from the culvert.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
1	Remove offensive graffiti.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	3 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.3	Avg. height:	1.85 (m)	Map Ref.:	ST 00746 87609
Panel Number:	- Max. height: 1.85	Panel length:	16.3 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	East Concrete Revetment			Primary Wall Material (Table G.15)	RA
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	5	C	7.1	R	H	See 1	✓	Failed revetment resulting in scour to embankment.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage	1	A						Good condition.
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
2	2	3	C	7.1	R	H	See 1	Undercut to concrete toe penetrating revetment.
2	2	3	C	5.1	R	M	£5,000	Displaced sections of concrete due to tree growth.

Inspector's Comments

The following defects require remedial action:
- The revetment has failed, resulting in scour to the embankment behind. Further scour will cause washout of the downstream sections.
- There is undercutting to the toe and revetment. Further undercut will result in desabilisation of the wall and potentially a localised collapse.
- Tree growth has caused displacement of large sections of concrete to the revetment. The displaced sections should be reinstated to prevent further deterioration of the revetment from occurring during periods of high rainfall.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Fill the void behind the revetment with a suitable backfill material and rebuild the revetment to match the existing. Alternatively, gabion baskets could be utilised to protect the embankments.	H	TBC
2	Remove all loose material and fill the areas with mass concrete.	H	See 1
2	Remove all loose material/displaced sections and replace with new to match the existing.	M	£5,000

Inspection type:		**Special**		Inspector:		**N.Tucker**			Form number:		**4**	of	**21**
Bridge Name:		**Tynybryn Footbridge**							Date:			**01/07/2020**	
Bridge Ref.:		**5.2.4**		Span width (m):		**2.4**			Map Ref.:			**ST 00733 87606**	
Span Number:		**1**		Span length (m):		**8**			Primary Deck Form (Table G.4)				**11**
Span Description:		**Tynybryn Footbridge - East Abutment & Training Wall**							Primary Deck Material (Table G.6)				**A**
All above ground elements inspected:		**No**		Photographs:		**Yes**			Secondary Deck Form (Table G.5)				**20**
Number of construction forms in bridge/span:						**1**			Secondary Deck Material (Table G.6)				**P**
Inspector's Overall Assessment				**Condition Indicator and Scores**									
				Average score for structure					Span score				
N/A				BCI av.	N/A	BCS av.		**N/A**	BCI av.	-	BCS av.		-
				BCI crit.	**N/A**	BCS crit.		**N/A**	BCI crit.	-	BCS crit.		-

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Deck Elements	1	Primary Deck Element	NI							
	2	Transverse Beams								
	3	Secondary Deck Element								
	4	Half Joints								
	5	Tie Beams/Rods								
	6	Parapet Beam or Cantilever								
	7	Deck Bracing								
Load Bearing Substructure	8	Foundations								
	9	Abutments (Incl. Arch Springing	1	A	-	-	-	-		Good condition
	10	Spandrel Wall / Head Wall								
	11	Pier / Column								
	12	Cross-head / Capping Beam								
	13	Bearings								
	14	Bearing Plinth / Shelf								
Durability Elements	15	Superstructure Drainage								
	16	Substructure Drainage								
	17	Waterproofing	2	C	14.1	N	-	-		Green staining to abutment.
	18	Movement / Expansion Joints								
	19	Painting: Deck Elements								
	20	Surface Finishes: Superstructure								
	21	Surface Finishes: Substructure								
	22	Painting: Parapets / Safety Fences								
Safety Elements	23	Access / Walkways / Gantries								
	24	Handrail / Parapets / Safety Fences								
	25	Carriageway Surfacing								
	26	Footway / Verge / Footbridge Surface								
Other Bridge Elements	27	Invert / River Bed	5	E	7.1	R	H	£25,000		Failed concrete invert causing failure of gabion baskets (see 30)
	28	Aprons	3	B	7.1	R	H	See 1		Undercut to concrete bagwork.
	29	Fenders / Cutwaters / Collision Defense								
	30	River Training Works	4	E	7.1	R	H	See 27		Leaning and undercut gabion baskets in poor condition.
	31	Revetment / Batter Paving								
	32	Wing Walls								

	33	Retaining Walls								
	34	Embankments								
	35	Machinery								
Ancillary Elements	36	Approach Rails / Barriers / Walls								
	37	Signs								
	38	Lighting								
	39	Services								
Other Deck Elements	40	Trash Screens								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:

- There are multiple areas where the gabion basket walls are in a poor condition and have failed. An area of particular concern is directly downstream of Tynybryn footbridge where the gabion baskets on the east side are undercut and leaning into the watercourse. Multiple baskets on the west side have also failed. There are remnants of previous concrete invert downstream of the footbridge. The failure of the invert is likely to have caused undercutting of the gabion baskets.
- Undercutting to concrete bagwork will continue to deteriorate if left unrepaired.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
27, 30	Remove all failed gabion baskets and replace with new. Consideration should be taken into installing a concrete invert which extends from the downstream elevation of Tynybryn Footbridge to the end of the training walls.	H	£25,000
28	Remove all loose material, pump the areas dry and reinstate with mass concrete.	H	See 1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	5 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.5	Avg. height:	2 (m)	Map Ref.:	ST 00731 87592
Panel Number:	- Max. height: 3	Panel length:	20.3 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	East Earth Embankment			Primary Wall Material (Table G.15)	RO
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary								
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	1	A						Good condition.
	16	Invert / River Bed	-	-						Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

Embankment in good condition, with no signs of scour.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost

Inspection type:	**Special**		Inspector:	**N.Tucker**		Form number:	**6**	of	**21**		
Ret. Wall Name:	**-**					Date:	**01/07/2020**				
Ret. Wall Ref.:	**5.2.6**		Avg. height:	**2.6** (m)		Map Ref.:	**ST 00727 87576**				
Panel Number:	**-**	Max. height: **2.6**	Panel length:	**7** (m)		Primary Wall Form (Table G.14)	**R5**				
Span Description:	**East Gabion Basket Retaining Wall**					Primary Wall Material (Table G.15)	**RO**				
All above ground elements inspected:	**No**		Photographs:	**Yes**		Secondary Wall Form (Table G.14)	**N/A**				
Number of construction forms in bridge/span:				**1**		Secondary Wall Material (Table G.15)	**N/A**				

Inspector's Overall Assessment	**Condition Indicator and Scores**					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	3	E	7.1	R	H	See 4		Undercutting to gabion baskets which are in poor condition.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-						Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:

- The gabion baskets are in a poor condition. Further undercutting will result in the failure of the gabion baskets.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Remove failing gabion baskets and replace with new.	H	See 4

Inspection type:	Special	Inspector:	N.Tucker	Form number:	7 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.7	Avg. height:	3 (m)	Map Ref.:	ST 00717 87568
Panel Number:	- Max. height: 4.7	Panel length:	53.9 (m)	Primary Wall Form (Table G.14)	R2
Span Description:	East Concrete Retaining Wall			Primary Wall Material (Table G.15)	RB
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	2	D	5.2	N	-	-		Overhanging vegetation and moss growth.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	1	A						Loose stone.
	17	Aprons	-	-						Good condition.
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The concrete retaining wall was found to be in a good condition overall, with no sigificant defects identified.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost

Inspection type:	Special	Inspector:	N.Tucker	Form number:	8 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.8	Avg. height:	2 (m)	Map Ref.:	ST 00705 87529
Panel Number:	- Max. height: 3	Panel length:	47.4 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	East Earth Embankment			Primary Wall Material (Table G.15)	RO
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary								
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	2	E	5.2	RM	-	£1		Japanese Knotweed present to the Embankment.
	16	Invert / River Bed	-	-						Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

Embankment in good condition, with no signs of scour.
The Japanese Knotweed should be removed.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
15	Employ a specialist contractor to safely remove the Japanese Knotweed.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	9 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.9	Avg. height:	2.1 (m)	Map Ref.:	ST 00689 87489
Panel Number:	- Max. height: 2.1	Panel length:	26.5 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	East Concrete Revetment			Primary Wall Material (Table G.15)	RA
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	5	D	7.1	R	H	TBC		Two sections of the revetment failed due to scour.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons	3	C	7.1	R	H	See 1		Concrete apron undercut & is beginning to penetrate toe.
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- The revetment has failed, resulting in scour to the embankment behind. Further scour will cause washout of the downstream sections.
- There is undercutting to the concrete toe and apron. Further undercut will result in undermining of the revetment, leading to destabilisation of the structure.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Fill the void behind the revetment with a suitable backfill material and rebuild the revetment to match the existing. Alternatively, gabion baskets could be utilised to protect the embankments.	H	TBC
2	Remove all loose material and fill the areas with mass concrete.	H	See 1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	10 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.2.10	Avg. height:	3 (m)	Map Ref.:	ST 00679 87463
Panel Number:	- Max. height: 3.7	Panel length:	92.5 (m)	Primary Wall Form (Table G.14)	R2
Span Description:	East Concrete Retaining Wall			Primary Wall Material (Table G.15)	RB
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	5	B	7.1	R	H	See 4	✓	Gabion baskets at downstream end of wall have failed, resulting in washout behind the concrete retaining wall.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage	2	B	8.3	N	-	-		Fractured clay drainage pipe.
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	2	B	7.2	N	-	-		Invert consists of loose stone. Section of failed revetment and debris build-up within watercourse.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
2	2	2	D	5.2	RM	-	£1	Moss, overhaning vegetation and Japanese Knotweed growth to retaining wall.

Inspector's Comments

The East abutment was found to be in a good condition, with no defects identified.
The following defects require remedial action:
- The gabion baskets should be removed and replaced with new to prevent further washout.
- Japanese Knotweed should be removed.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Remove failed gabion baskets and replace with new.	H	See 4
2	Employ a specialist contractor to safely remove the Japanese Knotweed.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	11 of 21
Ret. Wall Name:	-			Date:	29/06/2020
Ret. Wall Ref.:	5.3.1	Avg. height:	1.25 (m)	Map Ref.:	ST 00820 87753
Panel Number:	- Max. height: 1.25	Panel length:	84.3 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	West Concrete Revetment			Primary Wall Material (Table G.15)	RA
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	3	B	3.1	R	M	See 3	✓	Missing section of concrete.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
2	2	2	E	5.2	RM	-	£1	Dense vegetation growth including Japanese Knotweed.

Inspector's Comments

The following defects require remedial action:
- The missing section of concrete should be replaced with new to match the existing.
- Vegetation growth including Japanese Knotweed obscured the inspection of this element.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Remove all loose material/displaced sections and replace with new to match the existing.	M	See 3
2	Remove vegetation and dispose of waste off site. A specialist contractor should be employed to safely remove the Japanese Knotweed.	-	£1

Inspection type:	**Special**			Inspector:	**N.Tucker**			Form number:	**12**	of	**21**		
Ret. Wall Name:	**-**							Date:	**29/06/2020**				
Ret. Wall Ref.:	**5.3.2**			Avg. height:	**2** (m)			Map Ref.:	**ST 00788 87637**				
Panel Number:	**-**	Max. height:	**3.2**	Panel length:	**16.9** (m)			Primary Wall Form (Table G.14)	**R2**				
Span Description:	**West Concrete Retaining Wall**							Primary Wall Material (Table G.15)	**RB**				
All above ground elements inspected:	**No**			Photographs:	**Yes**			Secondary Wall Form (Table G.14)	**N/A**				
Number of construction forms in bridge/span:	**1**							Secondary Wall Material (Table G.15)	**N/A**				

Inspector's Overall Assessment	**Condition Indicator and Scores**					
	Average score for structure				Span score	
	BCI av. -	BCS av. -			BCI av. -	BCS av. -
-	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	2	E	5.2	RM	-	£1		Heavy and dense vegetation growth obscuring inspection.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	2	B	7.1	R	H	See 1		Scour hole to right side of invert.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- Vegetation growth should be removed.
- Scour hole should be filled with mass concrete.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Remove vegetation and dispose of waste off site.	-	£1
16	Remove all loose material and fill the area with mass concrete.	H	See 1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	13 of 21
Culvert Name:	Tynybryn Culvert			Date:	29/06/2020
Culvert Ref.:	5.3.3	Span width (m):	8	Map Ref.:	ST 00783 87629
Span Number:	1	Span length (m):	38.5	Primary Deck Form (Table G.4)	19
Span Description:	Trapezoidal shaped precast concrete sections			Primary Deck Material (Table G.6)	A
All above ground elements inspected:	No	Photographs:	Yes	Secondary Deck Form (Table G.5)	20
Number of construction forms in bridge/span:			1	Secondary Deck Material (Table G.6)	P

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
N/A	BCI av.	N/A	BCS av.	N/A	BCI av. -	BCS av. -
	BCI crit.	N/A	BCS crit.	N/A	BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Deck Elements	1	Primary Deck Element	1	A						Good condition.
	2	Transverse Beams								
	3	Secondary Deck Element								
	4	Half Joints								
	5	Tie Beams/Rods								
	6	Parapet Beam or Cantilever								
	7	Deck Bracing								
Load Bearing Substructure	8	Foundations								
	9	Abutments (Incl. Arch Springing								
	10	Spandrel Wall / Head Wall								
	11	Pier / Column								
	12	Cross-head / Capping Beam								
	13	Bearings								
	14	Bearing Plinth / Shelf								
Durability Elements	15	Superstructure Drainage	1	A						Good condition.
	16	Substructure Drainage								
	17	Waterproofing	2	C	14.1	N	-	-		White and green coloured infilration.
	18	Movement / Expansion Joints	2	B		N	-	-		Missing and loose jointing to invert.
	19	Painting: Deck Elements								
	20	Surface Finishes: Superstructure								
	21	Surface Finishes: Substructure								
	22	Painting: Parapets / Safety Fences								
Safety Elements	23	Access / Walkways / Gantries								
	24	Handrail / Parapets / Safety Fences	NI							
	25	Carriageway Surfacing								
	26	Footway / Verge / Footbridge Surface	NI							
Other Bridge Elements	27	Invert / River Bed	1	A						Good condition.
	28	Aprons								
	29	Fenders / Cutwaters / Collision Defense								
	30	River Training Works	2	B	7.1	N	-	-		Minor area of scour to downstream weir.
	31	Revetment / Batter Paving								
	32	Wing Walls								

	33	Retaining Walls								
	34	Embankments								
	35	Machinery								
Ancillary Elements	36	Approach Rails / Barriers / Walls								
	37	Signs								
	38	Lighting								
	39	Services								
Other Deck Elements	40	Trash Screens								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The culvert was found to be in a good condition overall, with only a few minor defects identified.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost

Inspection type:	**Special**			Inspector:	**N.Tucker**			Form number:	**14**	of	**21**		
Ret. Wall Name:	**-**							Date:	**01/07/2020**				
Ret. Wall Ref.:	**5.3.4**			Avg. height:	**1.85** (m)			Map Ref.:	**ST 00746 87609**				
Panel Number:	**-**	Max. height:	**1.85**	Panel length:	**16.3** (m)			Primary Wall Form (Table G.14)	**R7**				
Span Description:	**West Concrete Revetment**							Primary Wall Material (Table G.15)	**RA**				
All above ground elements inspected:	**No**			Photographs:	**Yes**			Secondary Wall Form (Table G.14)	**N/A**				
Number of construction forms in bridge/span:	**1**							Secondary Wall Material (Table G.15)	**N/A**				

Inspector's Overall Assessment	**Condition Indicator and Scores**					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	5	D	7.1	R	H	See 1		Multiple sections of revetment failed resulting in scour to embankment.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons	3	E	7.1	R	H	See 1		Concrete toe undercut & undermining revetment.
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- The revetment has failed, resulting in scour to the embankment behind. Further scour will cause washout of the downstream sections.
- There is undercutting to the concrete toe and revetment. Further undercut will result in undermining of the revetment, leading to destabilisation of the structure.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Fill the void behind the revetment with a suitable backfill material and rebuild the revetment to match the existing. Alternatively, gabion baskets could be utilised to protect the embankments.	H	TBC
2	Remove all loose material and fill the areas with mass concrete.	H	See 1

Inspection type:		**Special**		Inspector:		**N.Tucker**			Form number:		**15**	of	**21**
Bridge Name:		**Tynybryn Footbridge**							Date:		**01/07/2020**		
Bridge Ref.:		**5.3.5**		Span width (m):		**2.4**			Map Ref.:		**ST 00733 87606**		
Span Number:		**1**		Span length (m):		**8**			Primary Deck Form (Table G.4)				**11**
Span Description:		**Tynybryn Footbridge - West Abutment & Training Wall**							Primary Deck Material (Table G.6)				**A**
All above ground elements inspected:		**No**		Photographs:		**Yes**			Secondary Deck Form (Table G.5)				**20**
Number of construction forms in bridge/span:						**1**			Secondary Deck Material (Table G.6)				**P**
Inspector's Overall Assessment				**Condition Indicator and Scores**									
				Average score for structure					Span score				
N/A				BCI av.	N/A	BCS av.		**N/A**	BCI av.	-	BCS av.		-
				BCI crit.	**N/A**	BCS crit.		**N/A**	BCI crit.	-	BCS crit.		-

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Deck Elements	1	Primary Deck Element	NI							
	2	Transverse Beams								
	3	Secondary Deck Element								
	4	Half Joints								
	5	Tie Beams/Rods								
	6	Parapet Beam or Cantilever								
	7	Deck Bracing								
Load Bearing Substructure	8	Foundations								
	9	Abutments (Incl. Arch Springing	1	A	-	-	-	-		Good condition
	10	Spandrel Wall / Head Wall								
	11	Pier / Column								
	12	Cross-head / Capping Beam								
	13	Bearings								
	14	Bearing Plinth / Shelf								
Durability Elements	15	Superstructure Drainage								
	16	Substructure Drainage								
	17	Waterproofing								
	18	Movement / Expansion Joints								
	19	Painting: Deck Elements								
	20	Surface Finishes: Superstructure								
	21	Surface Finishes: Substructure								
	22	Painting: Parapets / Safety Fences								
Safety Elements	23	Access / Walkways / Gantries								
	24	Handrail / Parapets / Safety Fences								
	25	Carriageway Surfacing								
	26	Footway / Verge / Footbridge Surface								
Other Bridge Elements	27	Invert / River Bed								
	28	Aprons	2	B	7.1	N	-	-		Scour to apron protecting west abutment.
	29	Fenders / Cutwaters / Collision Defense								
	30	River Training Works	5	C	7.1	R	H	See 4		Multiple failed & undercut gabion baskets.
	31	Revetment / Batter Paving								
	32	Wing Walls								

	33	Retaining Walls								
	34	Embankments								
	35	Machinery								
Ancillary Elements	36	Approach Rails / Barriers / Walls								
	37	Signs								
	38	Lighting								
	39	Services								
Other Deck Elements	40	Trash Screens								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:

- There are multiple areas where the gabion basket walls are in a poor condition and have failed. An area of particular concern is directly downstream of Tynybryn footbridge where the gabion baskets on the east side are undercut and leaning into the watercourse. Multiple baskets on the west side have also failed. There are remnants of previous concrete invert downstream of the footbridge. The failure of the invert is likely to have caused undercutting of the gabion baskets.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
30	Remove all failed gabion baskets and replace with new. Consideration should be taken into installing a concrete invert which extends from the downstream elevation of Tynybryn Footbridge to the end of the training walls.	H	£25,000

Inspection type:	**Special**		Inspector:	**N.Tucker**		Form number:	**16**	of	**21**		
Ret. Wall Name:	**-**					Date:	**01/07/2020**				
Ret. Wall Ref.:	**5.3.6**		Avg. height:	**2.3** (m)		Map Ref.:	**ST 00724 87596**				
Panel Number:	**-**	Max. height: **2.3**	Panel length:	**13** (m)		Primary Wall Form (Table G.14)	**R7**				
Span Description:	**Rock Armour**					Primary Wall Material (Table G.15)	**RO**				
All above ground elements inspected:	**No**		Photographs:	**Yes**		Secondary Wall Form (Table G.14)	**N/A**				
Number of construction forms in bridge/span:				**1**		Secondary Wall Material (Table G.15)	**N/A**				

Inspector's Overall Assessment	**Condition Indicator and Scores**					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	3	C	7.1	R	M	£5,000		Displaced rock armour resutling in scour to embankment.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- Rock armour scour protection has become displaced in several areas, resulting in scour to the embankment behind. The rocks should be moved back to their original positions to prevent further scour to the embankments.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Reposition displaced rocks to prevent further scour to the embankments.	M	£5,000

Inspection type:	Special	Inspector:	N.Tucker	Form number:	17 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.3.7	Avg. height:	2.2 (m)	Map Ref.:	ST 00722 87586
Panel Number:	- Max. height: 2.5	Panel length:	66.6 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	West Earth Embankment			Primary Wall Material (Table G.15)	RO
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary								
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	3	B	7.1	RM	-	£1	✓	Scour to the embankment undercutting large trees.
	16	Invert / River Bed	-	-						Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
15	2	2	E	5.2	N	-	-	Dense vegetation growth to embankment.

Inspector's Comments

The following defects require remedial action:
- Trees should be removed to prevent them from falling into the watercourse and causing a blockage.

Name:	N.Tucker	Signed:	N.Tucker	Date:	14/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
15	Remove trees and dispose of waste off site.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	18 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.3.8	Avg. height:	2.2 (m)	Map Ref.:	ST 00699 87528
Panel Number:	- Max. height: 2.2	Panel length:	46.4 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	Rock Armour			Primary Wall Material (Table G.15)	RO
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	3	C	7.1	R	M	See 15	✓	Displaced rock armour resutling in scour to embankment.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- Rock armour scour protection has become displaced in several areas, resulting in scour to the embankment behind. The rocks should be moved back to their original positions to prevent further scour to the embankments.
- Japanese Knotweed should be removed.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Reposition displaced rocks to prevent further scour to the embankments.	M	£5,000
2	Employ a specialist contractor to safely remove Japanese Knotweed.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	19 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.3.9	Avg. height:	1.3 (m)	Map Ref.:	ST 00685 87493
Panel Number:	- Max. height: 1.3	Panel length:	11.5 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	West Concrete Revetment			Primary Wall Material (Table G.15)	RA
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	3	B	3.1	R	M	See 3	✓	Missing section of concrete.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall								
	16	Invert / River Bed	-	-	-	-	-	-		Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments
2	2	2	E	5.2	RM	-	£1	Dense vegetation growth including Japanese Knotweed.

Inspector's Comments

The following defects require remedial action:
- Section of missing concrete should be reinstated.
- Japanese Knotweed should be removed.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
2	Remove all loose material/displaced sections and replace with new to match the existing.	M	See 3
2	Employ a specialist contractor to safely remove the Japanese Knotweed.	-	£1

Inspection type:	Special	Inspector:	N.Tucker	Form number:	20 of 21
Ret. Wall Name:	-			Date:	01/07/2020
Ret. Wall Ref.:	5.3.10	Avg. height:	2.5 (m)	Map Ref.:	ST 00690 87486
Panel Number:	- Max. height: 2.5	Panel length:	16 (m)	Primary Wall Form (Table G.14)	R7
Span Description:	West Earth Embankment			Primary Wall Material (Table G.15)	RO
All above ground elements inspected:	No	Photographs:	Yes	Secondary Wall Form (Table G.14)	N/A
Number of construction forms in bridge/span:			1	Secondary Wall Material (Table G.15)	N/A

Inspector's Overall Assessment	Condition Indicator and Scores					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -			BCI av. -	BCS av. -
	BCI crit. -	BCS crit. -			BCI crit. -	BCS crit. -

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary								
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage								
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	2	B	3.7	N	-	-		Displaced section of concrete present to embankment.
	16	Invert / River Bed	-	-						Loose stone.
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

Embankment was found to be in a good condition, with no scour identified.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost

Inspection type:	**Special**		Inspector:	**N.Tucker**		Form number:	**21**	of	**21**		
Ret. Wall Name:	**-**					Date:	**01/07/2020**				
Ret. Wall Ref.:	**5.3.11**		Avg. height:	**2.6** (m)		Map Ref.:	**ST 00680 87468**				
Panel Number:	**-**	Max. height: **3.05**	Panel length:	**92.5** (m)		Primary Wall Form (Table G.14)	**R2**				
Span Description:	**West Concrete Retaining Wall**					Primary Wall Material (Table G.15)	**RB**				
All above ground elements inspected:	**No**		Photographs:	**Yes**		Secondary Wall Form (Table G.14)	**N/A**				
Number of construction forms in bridge/span:				**1**		Secondary Wall Material (Table G.15)	**N/A**				

Inspector's Overall Assessment	**Condition Indicator and Scores**					
	Average score for structure				Span score	
-	BCI av. -	BCS av. -	BCI av. -	BCS av. -		
	BCI crit. -	BCS crit. -	BCI crit. -	BCS crit. -		

Set	No.	Element	S	Ex.	Def.	W	P	Cost	M	Comments
Main Elements	1	Foundations	-							
	2	Retaining Wall - Primary	2	C	5.2	N	-	-		Vegetation growth to retaining wall.
	3	Retaining Wall - Secondary								
	4	Parapet Beam / Plinth								
	21	Rock Anchors								
Durability Elements	5	Drainage	1	A						Good condition.
	6	Movement / Expansion Joints								
	7	Surface Finishes - Wall								
	8	Surface Finishes - Handrails / Parapets								
Safety Elements	9	Handrails / Parapets / Safety Fences								
	10	Carriageway - Top of Wall								
	11	Carriageway - Foot of Wall								
	12	Footway / Verge - Top of Wall								
	13	Footway / Verge - Foot of Wall								
Other	14	Embankment - Top of Wall								
	15	Embankment - Foot of Wall	2	E	5.2	RM	-	£1		Japanese Knotweed and Tree growth to embankment.
	16	Invert / River Bed								
	17	Aprons								
Ancillary Elements	18	Signs								
	19	Lighting								
	20	Services								

S - Severity, **Ex.** - Extent, **Def.** - Defect, **W** - Work Required, **P** - Priority of Work, **Cost** - Cost of Work

Multiple Defects

Element	Defect Number	S	Ext.	Def.	W	P	Cost	Comments

Inspector's Comments

The following defects require remedial action:
- Japanese Knotweed and trees should be removed from embankment.

Name:	N.Tucker	Signed:	N.Tucker	Date:	15/07/2020

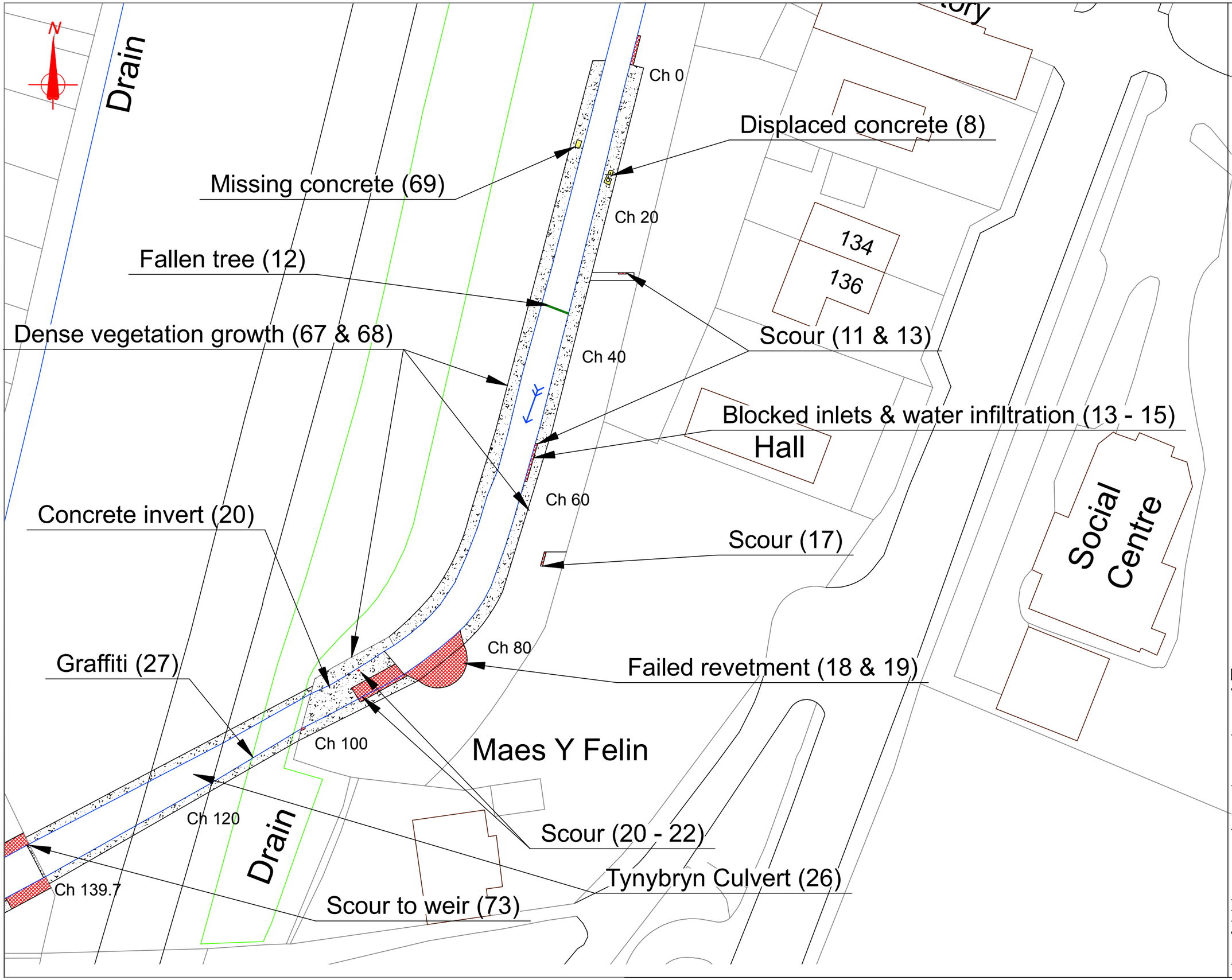
Engineer's Comments

Name:	Signed:	Date:

Work Required

Reference	Suggested Remedial Work	Priority	Estimated Cost
15	Remove trees and dispose of waste off site. Employ a specialist contractor to safely remove the Japanese Knotweed.	-	£1

Appendix D: Defects Sketch



Notes

1. Dimensions are in millimetres unless stated otherwise
2. Do not scale from this drawing.
3. Photograph numbers relating to Appendix B of the report are included in brackets.

Key

- Scour
- Missing/displaced concrete

Rev	By	Chkd	Apprvd	Date	Description

Client

Rhondda Cynon Taf County Borough Council

Edwards Diving Services Ltd.
Dragon House
Unit 17 Sir Alfred Owen Way
Pontygwindy Industrial Estate
Caerphilly, CF83 3HU

Tel: 029 2086 2020
www.edwardsdivingservices.co.uk

Project

Tynybryn River Channel Survey

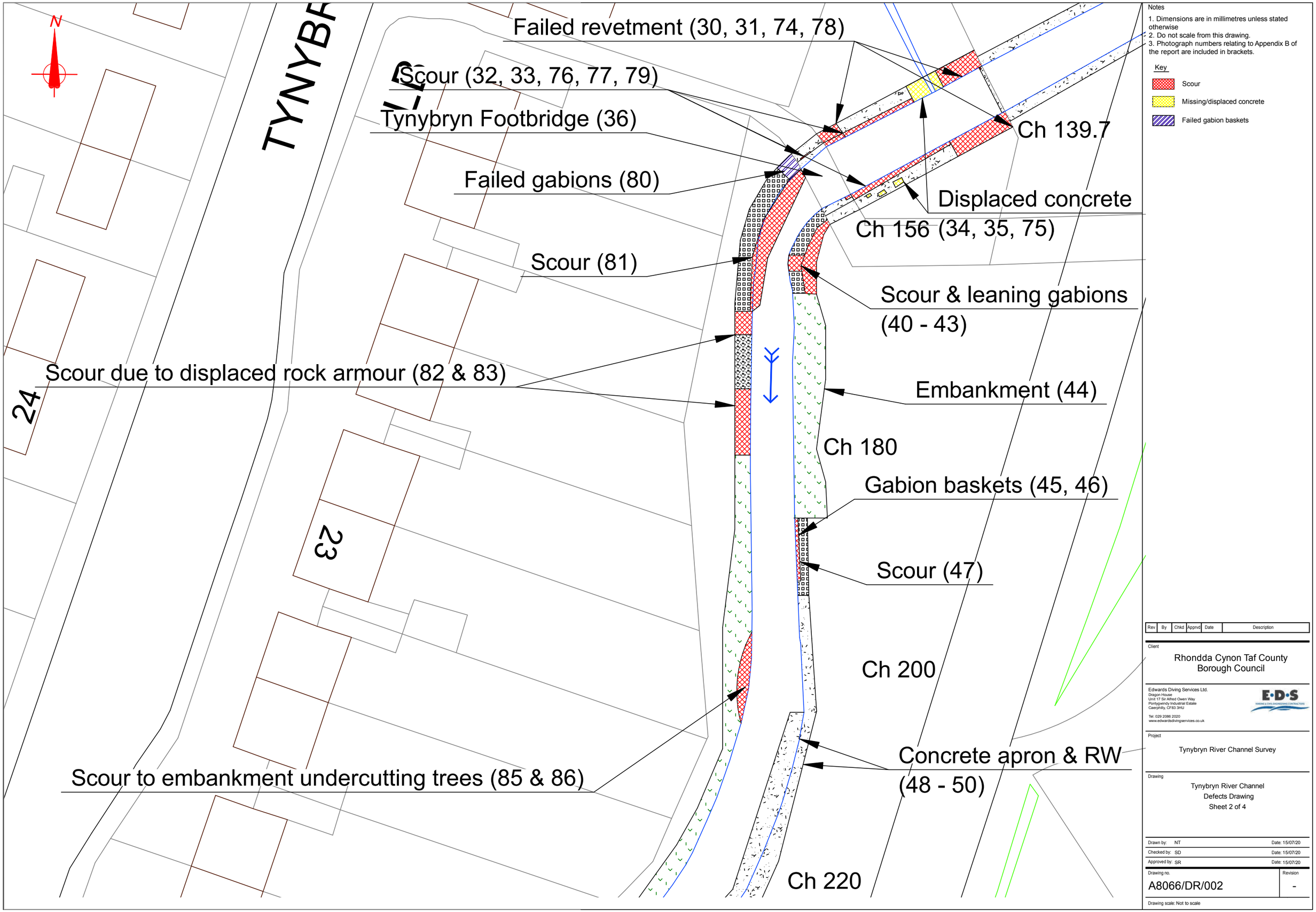
Drawing

Tynybryn River Channel
Defects Drawing
Sheet 1 of 4

Drawn by:	NT	Date: 15/07/20
Checked by:	SD	Date: 15/07/20
Approved by:	SR	Date: 15/07/20

Drawing no.	Revision
A8066/DR/001	-

Drawing scale: Not to scale



Notes

1. Dimensions are in millimetres unless stated otherwise
2. Do not scale from this drawing.
3. Photograph numbers relating to Appendix B of the report are included in brackets.

Key

- Scour
- Missing/displaced concrete
- Failed gabion baskets

Rev	By	Chkd	Apprvd	Date	Description

Client

Rhondda Cynon Taf County Borough Council

Edwards Diving Services Ltd.
Dragon House
Unit 17 Sir Alfred Owen Way
Pontygwindy Industrial Estate
Caerphilly, CF83 3HU

Tel: 029 2086 2020
www.edwardsdivingservices.co.uk

Project

Tynybryn River Channel Survey

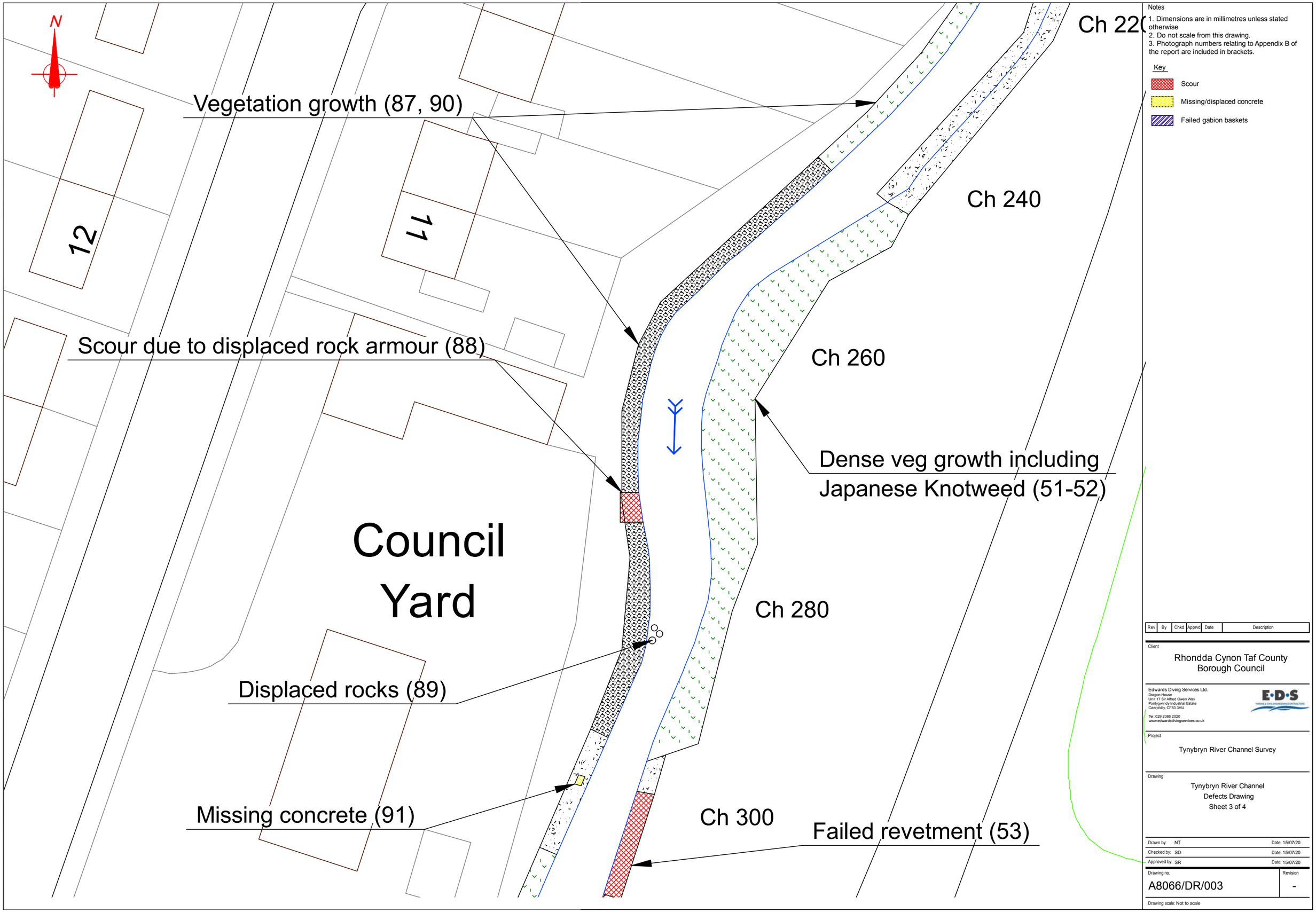
Drawing

Tynybryn River Channel
Defects Drawing
Sheet 2 of 4

Drawn by:	NT	Date: 15/07/20
Checked by:	SD	Date: 15/07/20
Approved by:	SR	Date: 15/07/20

Drawing no.	Revision
A8066/DR/002	-

Drawing scale: Not to scale



Notes

1. Dimensions are in millimetres unless stated otherwise
2. Do not scale from this drawing.
3. Photograph numbers relating to Appendix B of the report are included in brackets.

Key

- Scour
- Missing/displaced concrete
- Failed gabion baskets

Rev	By	Chkd	Apprvd	Date	Description

Client

Rhondda Cynon Taf County Borough Council

Edwards Diving Services Ltd.
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Project

Tynybryn River Channel Survey

Drawing

Tynybryn River Channel
Defects Drawing
Sheet 3 of 4

Drawn by:	NT	Date: 15/07/20
Checked by:	SD	Date: 15/07/20
Approved by:	SR	Date: 15/07/20

Drawing no.	Revision
A8066/DR/003	-

Drawing scale: Not to scale

N

Revetment in watercourse (60)

Scour (54)

Ch 320

Failed revetment (55)

Tree & Japanese Knotweed growth (95 & 96)

Ch 340

(Afon Elai)

Concrete RW (93)

Concrete RW (58 & 59)

Ch 360

Japanese Knotweed growth (62)

Ch 380

Debris (61)

East bridge abutment (63)

Ely River

Ch 400

Fractured drainage pipe (64)

Ch 413

Failed gabions resulting in washout (65 & 66)

0m

Notes

1. Dimensions are in millimetres unless stated otherwise
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Key

- Scour
- Missing/displaced concrete
- Failed gabion baskets

Rev	By	Chkd	Apprvd	Date	Description

Client

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Project

Tynybryn River Channel Survey

Drawing

Tynybryn River Channel
Defects Drawing
Sheet 4 of 4

Drawn by:	NT	Date: 15/07/20
Checked by:	SD	Date: 15/07/20
Approved by:	SR	Date: 15/07/20

Drawing no. A8066/DR/004

Revision -

Drawing scale: Not to scale

Appendix E: Inspection reference tables

Severity Codes

Code	Severity Description
1	As new condition, defect has no significant effect on the element (visually or functionally)
2	Early signs of deterioration, minor defect/damage, no reduction in functionality of element
3	Moderate defect/damage, some loss of functionality could be expected
4	Severe damage/defect, element no longer able to entirely fulfil its function and/or is close to failure/collapse
5	The element is non-functional/failed

Extent Codes

Code	Extent Description
A	No significant defect
B	Slight, not more than 5% of surface area
C	Moderate, 5 - 20% of surface area
D	Wide, 20 - 50% of surface area
E	Extensive, more than 50% of surface area

Permissible Severity and Extent Combinations

Extent	Severity				
	1	2	3	4	5
A	1A				
B		2B	3B	4B	5B
C		2C	3C	4C	5C
D		2D	3D	4D	5D
E		2E	3E	4E	5E

Work Required Codes

Code	Work description	Code	Work description
A	Add	R	Repair / Maintain
C	Change	S	Silane Impregnation
P	Paint	I	Investigation
N	No Action at Present, Monitor Only	RM	Routine Maintenance

Priority Ranking Codes

Code	Ranking
H	High: work should be done during the next financial year to ensure the safety of the public or safeguard structural integrity or avoid a high cost penalty.
M	Medium: work should be done during the next financial year. Postponement carries some cost penalty.
L	Low: work should be done within the next two financial years.

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