

# File Note

# ARUP

Admiral House Rose Wharf  
78 East Street  
Leeds LS9 8EE  
United Kingdom  
www.arup.com

t +44 113 242 8498  
f +44 113 242 8573

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Project title Victoria North River Works

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Prepared by Anna Lavelle, Isabel Wapenhans

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Subject Baseline Fluvial Geomorphology Survey

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## 1 Overview

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Fluvial geomorphology surveys were undertaken on the River Irk by Arup on Tuesday 8<sup>th</sup> June 2021 to determine the baseline conditions for the Victoria North River Works project, to support both the design of the scheme and the WFD assessment. The survey involved the use of the Esri ArcGIS Collector app to document the following:

- Geomorphological reaches and key characteristics of each reach
- Dominant channel characteristics including the location of geomorphological features and processes
- Presence of in-channel and riparian vegetation
- Dominant bed and bank sediment types
- Dominant and secondary flow types

The surveys also provided an opportunity to identify high level opportunities for mitigation and enhancement in the reaches upstream of the site.

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## 2 Survey Reaches

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The geomorphological walkover surveys were undertaken on the River Irk from (NGR SD8530800447) upstream of the Smedley Road bridge to just downstream of Scotland Weir (NGR SJ8412199178) where access would allow. The proposed activities for the Victoria North River Works encompass a length of approximately 500 m (

Figure 1) from Collyhurst Weir, adjacent to St Catherine's Woods (NGR SJ8485699650) to Scotland Weir (NGR SJ8412299178). The channel through the survey area is constrained by local infrastructure in most places (both railway lines and roads). The survey extended upstream of the area of proposed activities (from the rail bridge north of Smedley Road at NGR SD8530800447 to Collyhurst Weir at NGR SJ8485699650) to provide a better understanding of the river system and aid further understanding of the watercourse characteristics. It also allowed for the identification of unimpacted reaches of the channel to assess the potential for mitigation opportunities and enhancements, and areas that could provide a control site for any future monitoring required.

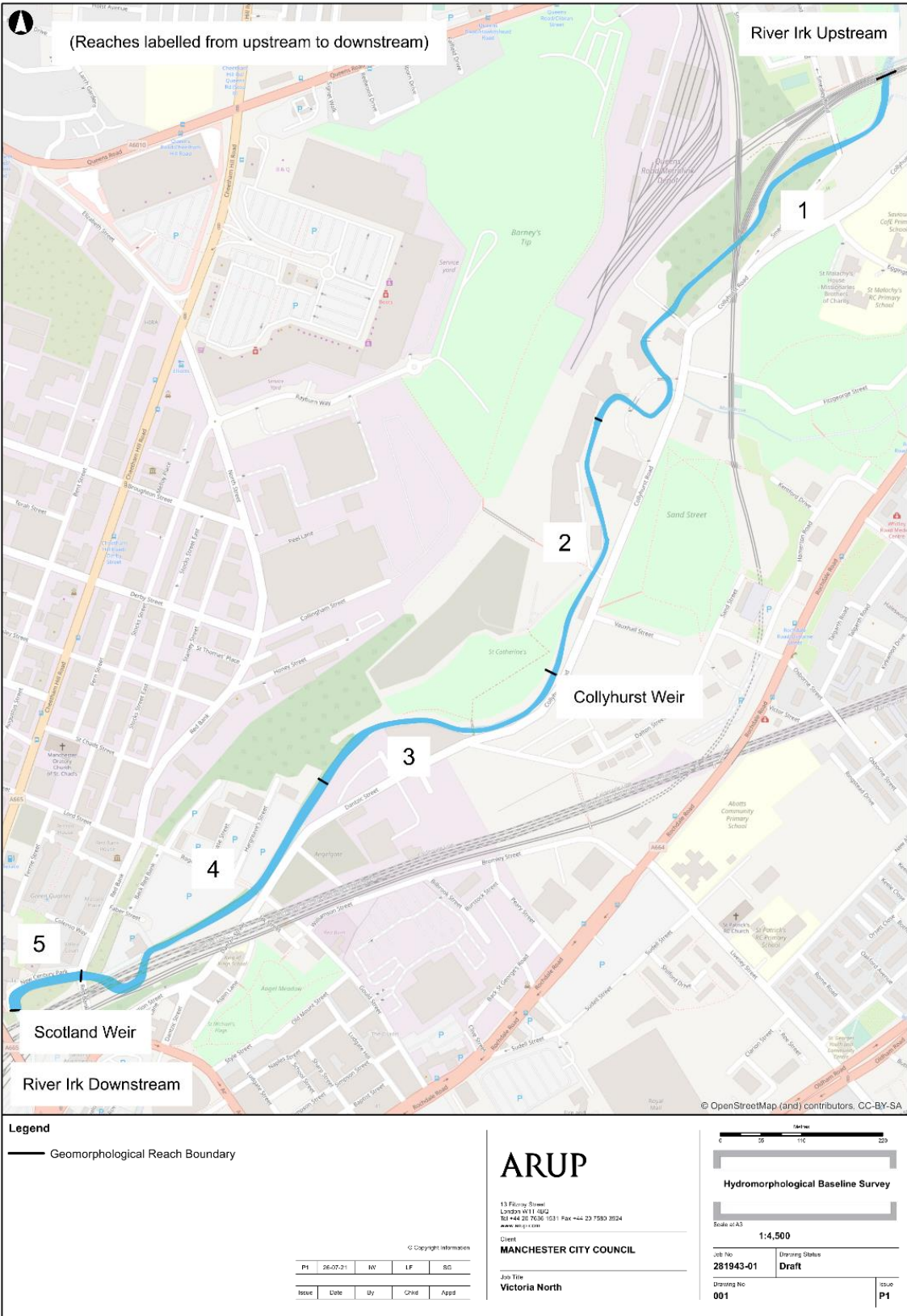
Five geomorphological reaches were identified during the walkover survey (see

Figure 1). Geomorphological reaches are sections of channel that have the same geomorphological processes and functionality. A new geomorphological reach can be defined, depending on changes in channel dimensions, bed or bank material, gradient, land use or the presence of a structure or tributary.

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**Figure 1:** Geomorphological reaches, numbered from upstream (1) to downstream (5). Reaches 3, 4 and 5 are located within the proposed scheme boundary. Reaches 1 and 2 are located outside of the proposed scheme boundary.

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## 2.1 Reach 1 – Rail bridge north of Smedley Road (SD8530800447) to industrial park on Collyhurst Road (SJ8491699981)

This reach marks the first reach and most upstream extent of the river surveyed outside of the site boundary. A road bridge for Smedley Road crosses the channel with a weir just downstream of the bridge. This reach is a uniform modified urban reach with an average wetted width of 8 m, wetted channel depth of 0.4 m, bankfull width of 11 m and bankfull depth of 3 m. There is stone pitching running along the left bank which is comprised of brick; the view is obscured on the right bank so bank materials cannot be identified. The dominant left and right bank riparian land use is deciduous woodland.

Riffles and glides dominate along this reach, although ponded sections are also present. The dominant substrate is comprised of cobbles, however silts, fine and coarse gravels, and boulders (mostly artificial material: rubbish) are also visible. There are also bars present comprised of cobbles. In particular, an 8 m long, 2.5 m wide point bar made of silt, fine gravel, coarse gravel and cobbles is present on the right bank near to the upstream limit of this reach. There are no sources of fine sediment or silty margins evident and no overhanging vegetation or channel shading throughout the reach.

The stone weir located downstream of the Smedley Road bridge is approximately 10 m wide across the channel with no sluice gates present. There is no sign of excessive bed or bank erosion, or excessive aggradation either upstream, downstream or at the structure. However, the weir is affecting channel morphology as well as flow and sediment continuity. There is no reduction in morphological diversity of the banks or bed. No other structures affecting channel morphology or flow and sediment continuity are visible along this reach. A further 4 m long, 1.5 m wide side bar made of fine and coarse gravel was recorded downstream of the weir.

There is evidence of waste (fly tipping) being deposited into the river at various points along this reach (although comparably, downstream reaches appear to be worse). The fly tipping within this reach is worst downstream of Smedley Road bridge and weir, mainly on bank sides.

Representative photographs from the reach can be seen below in Figures 2 to 5.

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**Figure 2:** Downstream view of Reach 1 from Smedley Road Bridge.

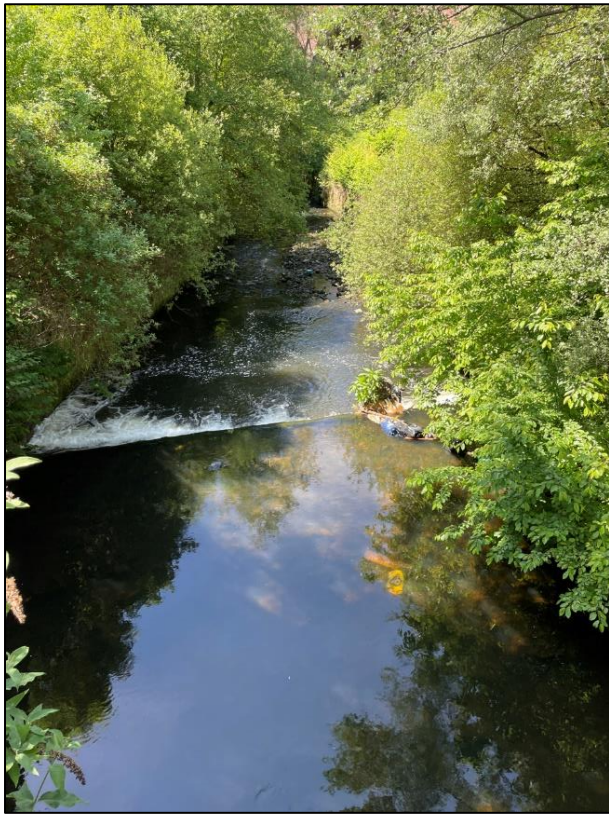


**Figure 3:** Downstream view of Reach 1.

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**Figure 4:** Downstream view of Reach 1 showing the 10 m stone weir.



**Figure 5:** Downstream view of Reach 1 showing the bar and microscale riffle feature.

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## 2.2      **Reach 2 – Industrial park on Collyhurst Road (SJ8491699981) to Collyhurst Weir at the middle of St Catherine's Wood (SJ8485699650)**

This reach is a uniform modified urban reach with an average wetted width of 5 m, wetted channel depth of 0.4 m, bankfull width of 8 m, and bankfull depth of 6 m. The left and right banks are comprised of natural material immediately adjacent to the channel with brick walls (approximately 7m high) located within the riparian zone. The left riparian bank land use is a road/path, while the right riparian bank land use is urban/industrial. The dominant substrate is silt, however there are also cobbles present on the channel bed. A side bar is present on the left bank at the downstream end of the reach. This bar is 2.5 m long and unvegetated. Furthermore macrophytes are present along the channel margins in places.

The dominant flow type throughout the reach is glide. There is a discharge point on the right bank which appears to be draining from a nearby industrial works. This has the potential to influence flows and contribute to pollution, as evidenced through the odorous smell observed. A road bridge (9 m wide across the channel) for access to nearby industrial properties with a pipe crossing exists halfway along the reach. There is no reduction in morphological diversity of the banks or bed as a result of this structure and no sign of excessive bed or bank erosion, or excessive aggradation. The structure also does not affect channel morphology or flow and sediment continuity. No barriers to fish passage, or sluice gates exist along this reach.

A 1.5 m high, 10 m wide stone weir is present in the channel, marking the end of Reach 2; this is Collyhurst Weir. There is pooling ahead of the weir, and a glide which turns into a riffle/run below the weir near an access ramp as shown in photograph(s) below (this is in the upstream extent of Reach 3). The weir is not causing excessive bed or bank erosion, or aggradation. However, it is affecting channel morphology, as well as flow and sediment continuity. The weir does not have a fish pass.

Representative photographs from the reach can be seen below in Figures 6 to 10.

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**Figure 6:** Downstream view of Reach 2 showing the brick wall on the right bank of the modified urban reach.



**Figure 7:** Upstream view of Reach 2 showing a road on the left, and the brick wall dominating the right bank.

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**Figure 8:** Right bank of Reach 2, showing a brick wall.



**Figure 9:** Downstream view of Collyhurst Weir (this is the upstream-most extent of Reach 3), showing flow types behind the weir which are sequences of runs and glides.

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**Figure 10:** Upstream view of Reach 2 showing Collyhurst Weir.

## 2.3 Reach 3 – Collyhurst Weir at the middle of St Catherine’s Wood (SJ8485699650) to Warford Street off Dantzic Street (SJ8453599479)

This reach is a uniform modified urban reach which begins behind Collyhurst Weir (see photograph(s) above). Collyhurst Weir is a 1.5 m high, 10 m wide stone weir. Approximately 15 m downstream of the weir, a glide is observed before it turns into a riffle/run. The weir is not causing excessive bed or bank erosion, or aggradation. However, it is affecting channel morphology, as well as flow and sediment continuity. The weir does not have a fish pass. A bar (made of artificial material: bricks) sits below the weir on right side. It is 3 m long, and 2 m wide, and is made up of cobbles and some bricks. Other smaller berms are also visible on the channel margins, made primarily of cobbles.

Reach 3 has an average wetted width of 6 m, wetted channel depth of 0.3 – 0.5 m, bankfull width of 6 m, and bankfull depth of 2.5 m. The planform is more channelised than the upstream reaches. The left and right bank materials are both artificial (comprised of brick walls). Land use on the left bank is road/path, while use on the right bank is deciduous woodland. The left and right banks are comprised of natural material but closely (< 1 m) followed by artificial material (brick walls which are roughly 7 m high). The left riparian bank land use is a road/path, while the right riparian bank land use is urban/ industrial. Artificial rubbish (up to boulder size) is scattered across substrate throughout the reach.

A footbridge crosses the river halfway along the reach.

Representative photographs from the reach can be seen below in Figures 11 to 15.

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**Figure 11:** View across channel of Reach 3, showing the bar made of cobbles.



**Figure 12:** Looking upstream from Reach 3 to the boundary near Reach 2 (Collyhurst Weir)

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**Figure 13:** Downstream view of Reach 3 showing footbridge across the river.



**Figure 14:** Upstream view of Reach 3 from footbridge, showing modified urban reach with boulder size rubbish scattered across substrate.

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**Figure 15:** Downstream view of Reach 3 from footbridge, showing modified urban reach with boulder size rubbish scattered across substrate.

## 2.4 Reach 4 - Warford Street off Dantzic Street (SJ8453599479) to culvert under rail bridge and Red Bank Street (SJ8437099280)

The river channel within Reach 4 is located within a constrained urban modified channel bounded predominantly by brick walls adjacent to infrastructure and buildings. As such, both the left and right banks are uniform and artificial in nature and provide very little ecological and hydromorphological diversity within the riparian and marginal zones. Dimensions are approximately 5 m for wetted channel width, 0.3 - 0.5 m for wetted channel depth, 5 m for bankfull width, and 3.5 m for bankfull depth. The brick walls on both bank sides are older than those present in the reach upstream and are crumbling/ contributing bricks into the channel. Intermittent vegetated stretches are observed in the marginal zone between the walls and wetted channel.

Flow in the upstream reach is dominated primarily by runs, though some diversity of flow is evident with glides also observed. An outfall is observed downstream of Vauxhall Road which has the potential to contribute to additional discharge entering the river.

The river bed is comprised predominantly of silt and cobbles, with no bedrock observed. The reach is dominated by depositional features including artificial berms and fine sediment, although scour was also observed along the banks where higher energy flows have undercut deposited sediment.

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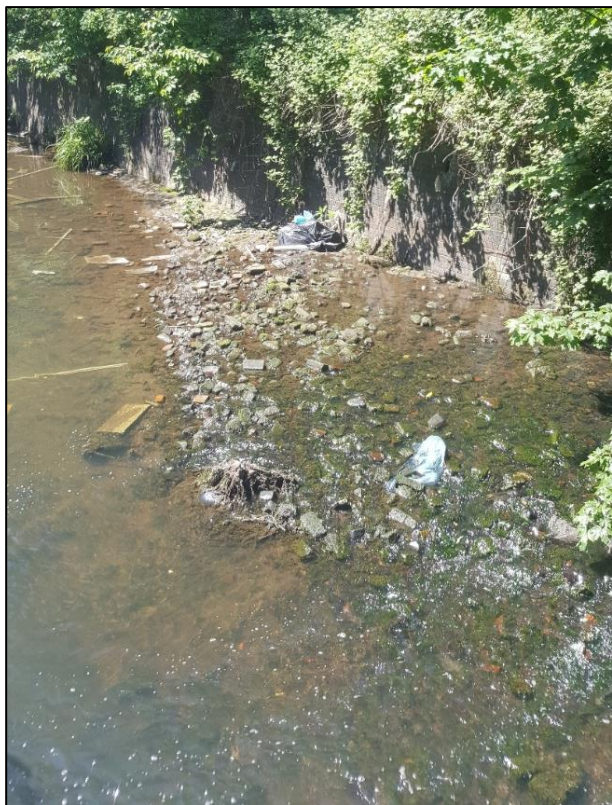
Fly tipping is evidently a serious and prolonged issue at this location, evidenced by a significant amount of large rubble alongside large quantities of tyres and home appliances.

Representative photographs from the reach can be seen below in Figures 16 to 19.

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**Figure 16:** Across-channel view of Reach 4 showing erosion of berm on right bank side.



**Figure 17:** Across-channel view of Reach 4 showing erosion of berm on right bank side.

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**Figure 18:** Downstream view of Reach 4 showing typical hydromorphology and tyres in channel.



**Figure 19:** Downstream view of Reach 4 from Vauxhall Road

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## 2.5 Reach 5 – Culvert under rail bridge and Red Bank Street (SJ8437099280) to Scotland Weir (SJ8412299178)

The upstream section of Reach 5 is culverted below the rail bridge for approximately 200 m. This reach is a uniform modified urban reach with an average wetted and bankfull channel width of 11 m, 0.3 - 0.4 m wetted channel depth and 2.5 m bankfull depth. The bankfull/wetted width decreases slightly to 8 - 10 m downstream of the culvert approaching Scotland Weir. The bank sides consist of brick walls on both sides for the duration of the reach with the reach ending at Scotland Weir. Land use is predominantly urban.

Along this reach, silt and cobbles are the dominant substrates. There is significant deposition of urban material, mainly tyres, home appliances and rubbish, although these are predominantly concentrated within the culvert.

Scotland Weir is approximately 8 m wide with a 3 m high impoundment. The structure is affecting channel morphology, flow continuity, sediment continuity both upstream and downstream of the structure. A glide is observed around the weir although there are localised areas of ponding observed. There is no bed or bank erosion as a result of the weir, nor excessive aggradation or reduction in morphological diversity of the bed or bank. The gradient is low (near flat) and there is no bed level variation. Along this reach, there are no significant sources of fine sediment input or silty margins observed. Moreover, no channel shading or overhanging bank and low vegetation is present.

Downstream of the reach extent (and end of the survey) is marked by a bridge. The reach below the downstream limit is a uniform modified urban reach with dimensions of 8 m for wetted channel width, 0.5 m for wetted channel depth, 12 m for bankfull width, and 3.5 m for bankfull depth. There is a bar on left bank which is 5 m long and 2 m wide, dominated by cobble material (and artificial rubbish). The channel margin is artificial (brick walls) on the left and right bank sides, and the land use beyond the left and right bank is urban.

Representative photographs from the reach can be seen below in Figures 20 to 24.

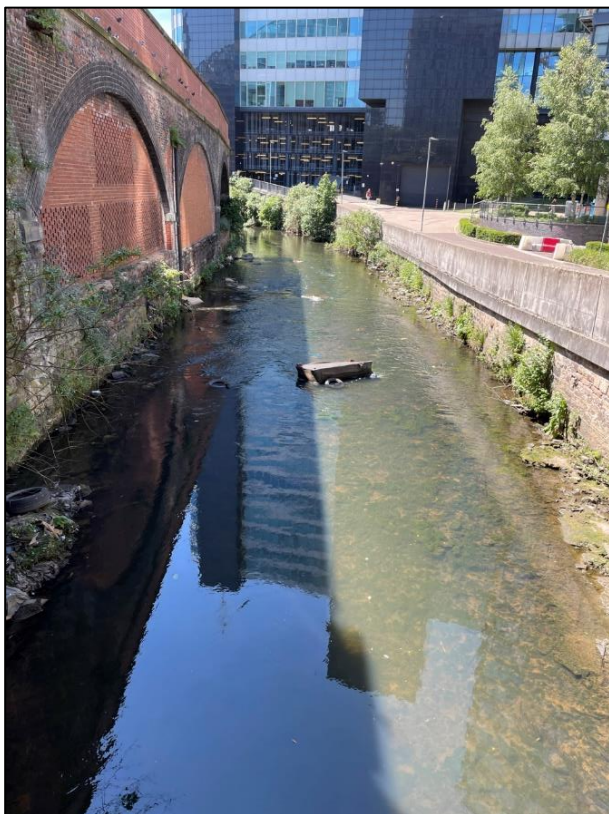
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**Figure 20:** Culvert upstream of Scotland Weir



**Figure 21:** Looking downstream of culvert

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**Figure 22:** Scotland Weir



**Figure 23:** Bar under bridge d/s of Scotland Weir

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**Figure 24:** Scotland Weir, the downstream end of Reach 5 and the survey area.

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## 3 Summary

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The reaches covered in this survey are predominantly urban in nature. The channel has been straightened and is confined on both sides by hardened banks, meaning it is poorly connected to the floodplain throughout the reaches within the site boundary. The channel displays little bank-full and wetted width variation through the reaches. The reaches display little diversity of flow and channel morphology, however riffle, run and pool flow types all observed to varying degrees.

Sediment inputs to the reach from bank erosion is minimal, therefore depositional material observed at bars are likely to be transported from further upstream. Fly-tipping waste is contributing to significant amount of artificial waste in the channel, although crumbling bricks and rubble are also likely to be contributing factors.

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### DOCUMENT CHECKING (not mandatory for File Note)

|           | Prepared by                    | Checked by                                                                         | Approved by                                                                          |
|-----------|--------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Name      | Anna Lavelle, Isabel Wapenhans | Laura Foden                                                                        | Sally German                                                                         |
| Signature |                                |  |  |