Grangemouth Flood Protection Scheme

Technical Note - North Shore Road Carriageway Width

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Falkirk Council

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Grangemouth Flood Protection Scheme

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Contents

1. Introduction

Forth Ports have noted during meetings/ discussions that the proposed flood defences could reduce the obstruction free width along North Shore Road which could impact Forth Ports ability to transport abnormally wide loads along North Shore Road.

The purpose of this technical note is to outline the impact the proposed flood defences would have on the carriageway width (surfaced road) and the obstruction free width along North Shore Road once the flood defences are constructed. It does not consider temporary reductions in width during the construction phase when temporary traffic management will be in use.

This technical note will consider:

- The current available carriageway and obstruction free widths.
- Carriageway and obstruction free widths following construction of the scheme.

2. Current Widths

Figure 1 outlines the location of North Shore Road around the northern boundary of the port from the access into the old school building to the Ineos RLPG facility where the road goes inland.

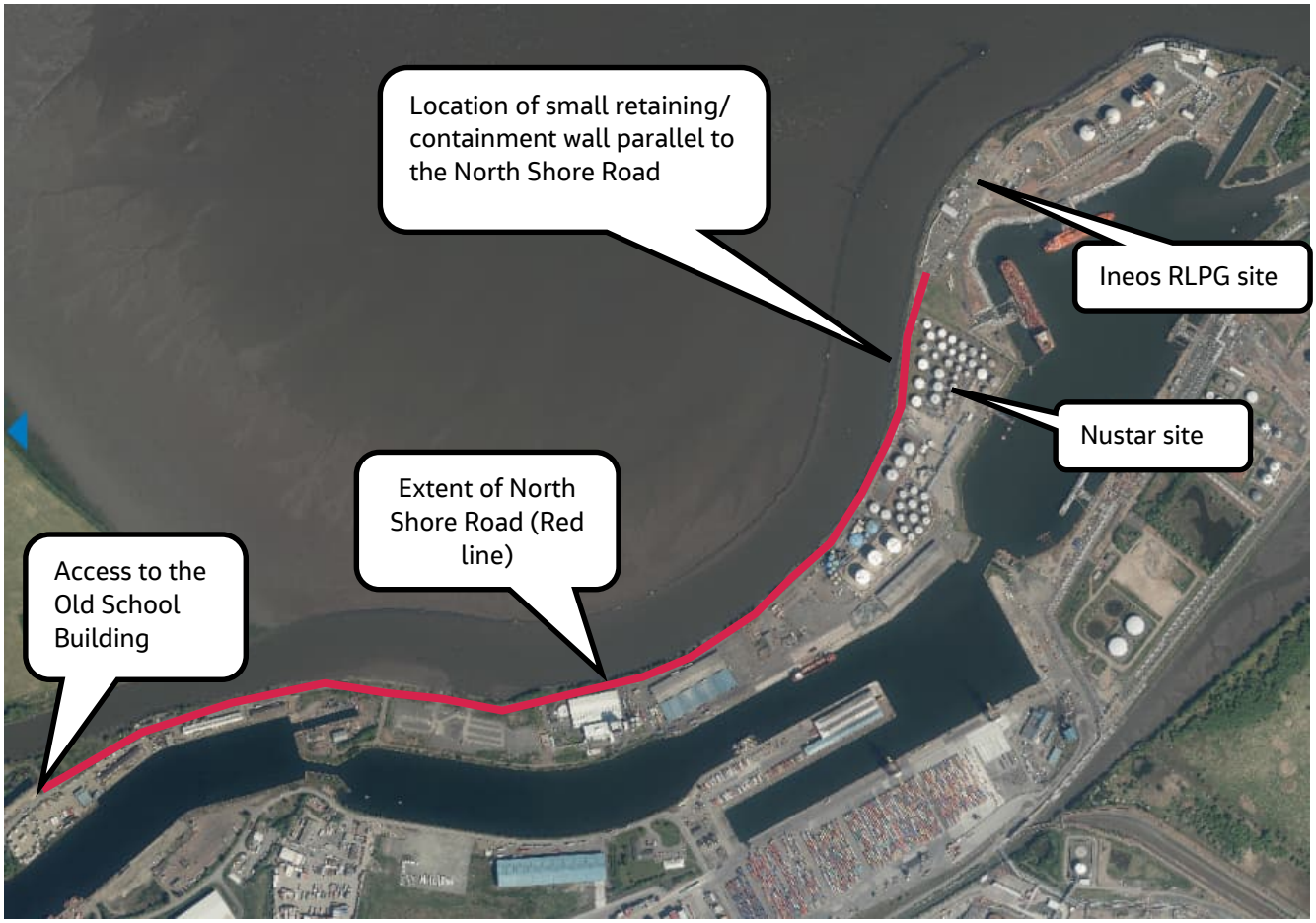

Figure 1: Location of North Shore Road, in the Port of Grangemouth

The current carriageway (surfaced) width of North Shore Road varies from 6.17m-10.28m based on measurements extracted from the topographic survey carried out as part of the scheme development. The obstruction free width (between top of bank and any obstructions e.g. fences or buildings, excluding demountable street lighting columns) along North Shore Road varies from 12.37m-22.10m. The bank crest (top of bank) has been used as a boundary for the widths but in practical terms there is no obstructions beyond the bank crest/top and abnormally wide loads could over-hang the bank crest/top.

If wide loads are transported along North Shore Road, the roadside verge would allow for loads to overhang the vehicle. There is a small concrete containment wall parallel to North Shore Road near the Nustar site. The wall is approx. 0.4m high from top of kerb and 390 m in length, see figure 2. On the seaward side of North Shore Road (except for the small concrete wall), the roadside verge is at least 5m wide and generally flat/or sloping away from the carriageway with no further obstructions. There are street lighting columns on the seaward side of the carriageway, some of the lighting columns are mounted on large concrete blocks., whilst others are installed directly into the ground. It is presumed that the lighting columns could be moved temporarily if needed? On the landward side of North Shore Road, the width of the road-side verge is generally greater than 2m, with buildings and boundary fences defining the edge of the verge and the end of the obstruction free width.

The current pinch point along North Shore Road is at the Nustar site, where the small concrete wall and the boundary defence restrict the obstruction free width to 8.92m, with the carriageway (surfaced) width being

6.17m. Behind the boundary fence is a concrete wall around the tanks. For the purpose of this technical note, no refence has been made to the wall inside the fence line as the fence is deemed to be a constraint.

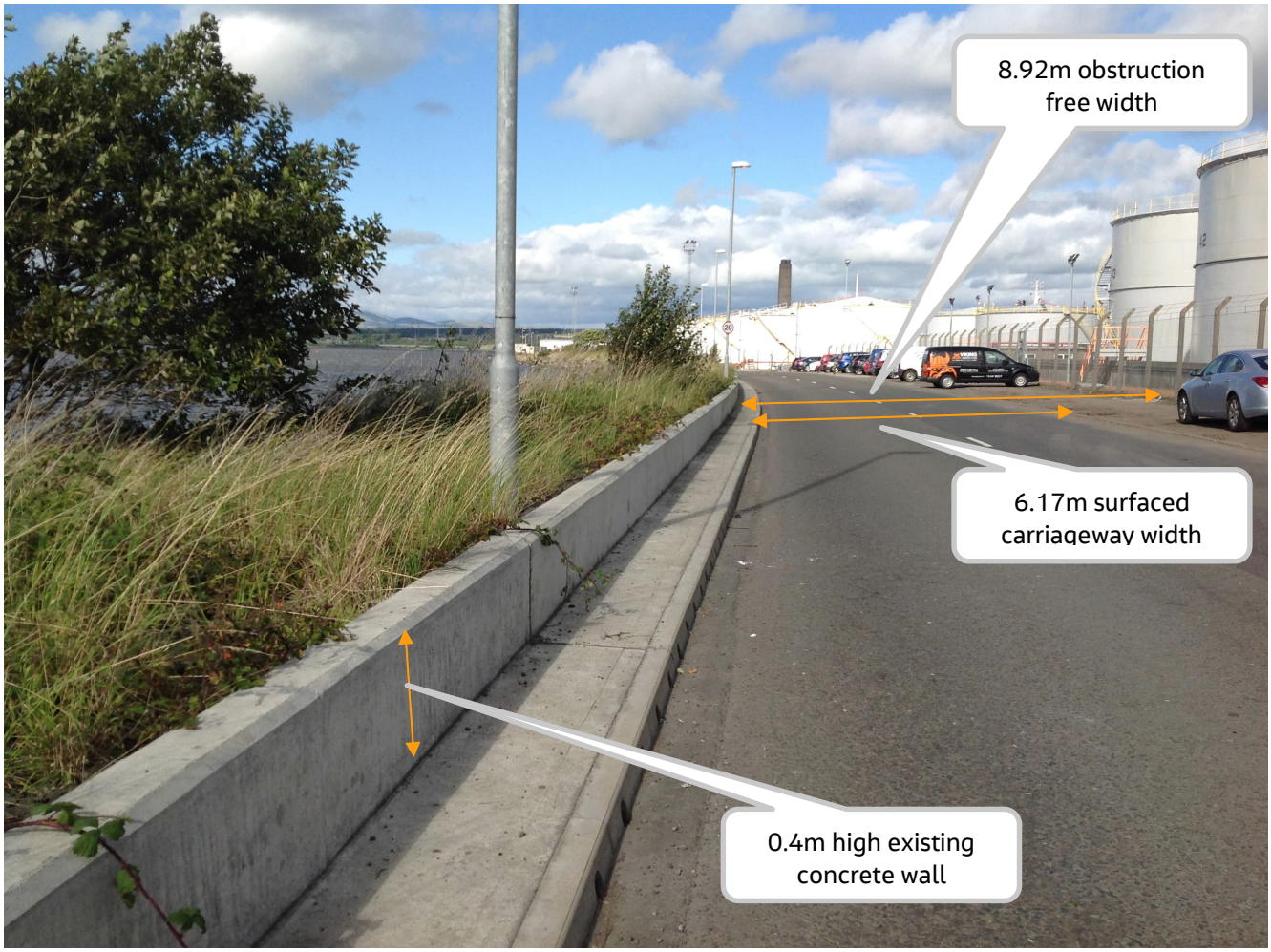

Figure 2 North Shore Road, showing small concrete containment wall

3. Widths post Scheme

The centreline of the proposed flood defence wall will be set back approx. 1m from the seaward edge (kerb face) of North Shore Road. The flood wall varies in height from <1m up to 1.6m (close to the Nustar/RLPG site) above road level.

In order to illustrate the potential impact of the proposed flood defence on the available carriageway/ obstruction free width we have considered five locations. Figure 3 outlines the locations along North Shore Road, which have been considered. Cross sections have been prepared at these locations to show the position of the proposed flood wall, North Shore Road and identify the carriageway width.

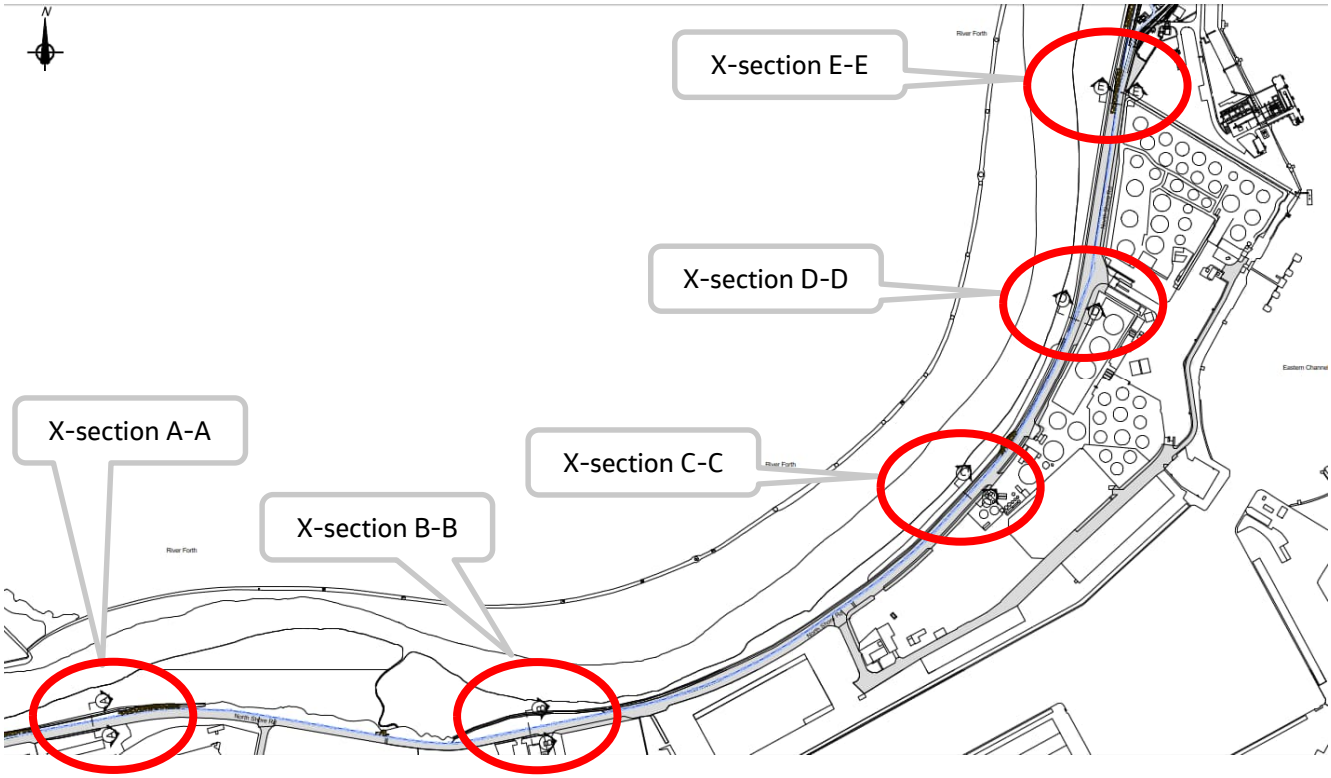

Figure 3 location of x-sections along North Shore Road

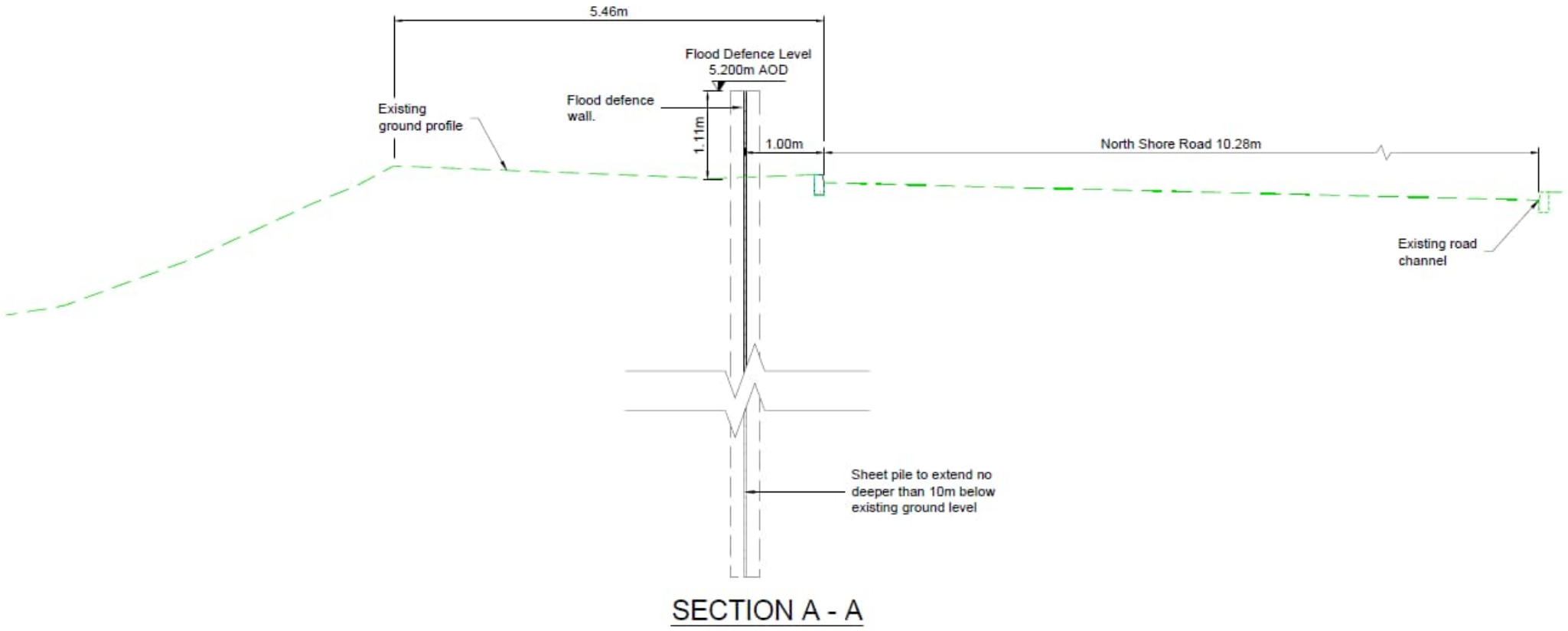

Figure 4 Typical X-section A-A along North Shore Road

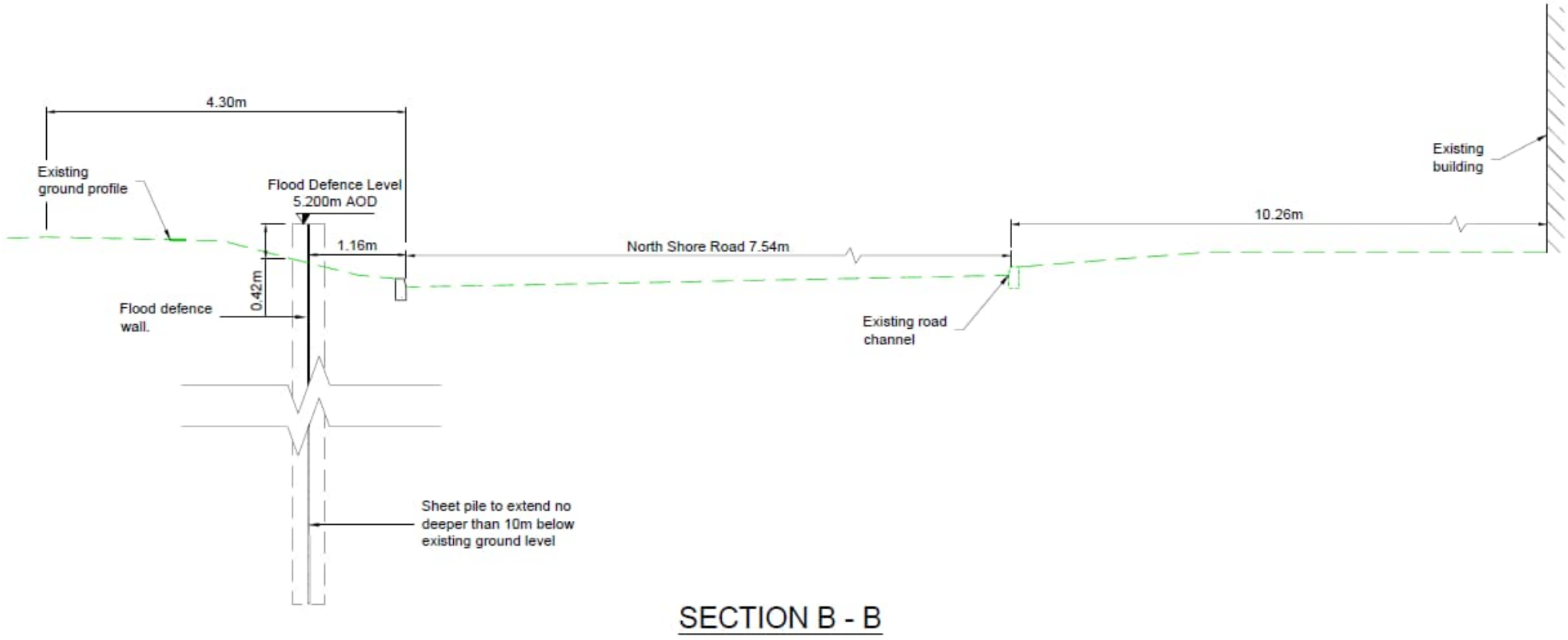

Figure 5 Typical X-section B-B along North Shore Road

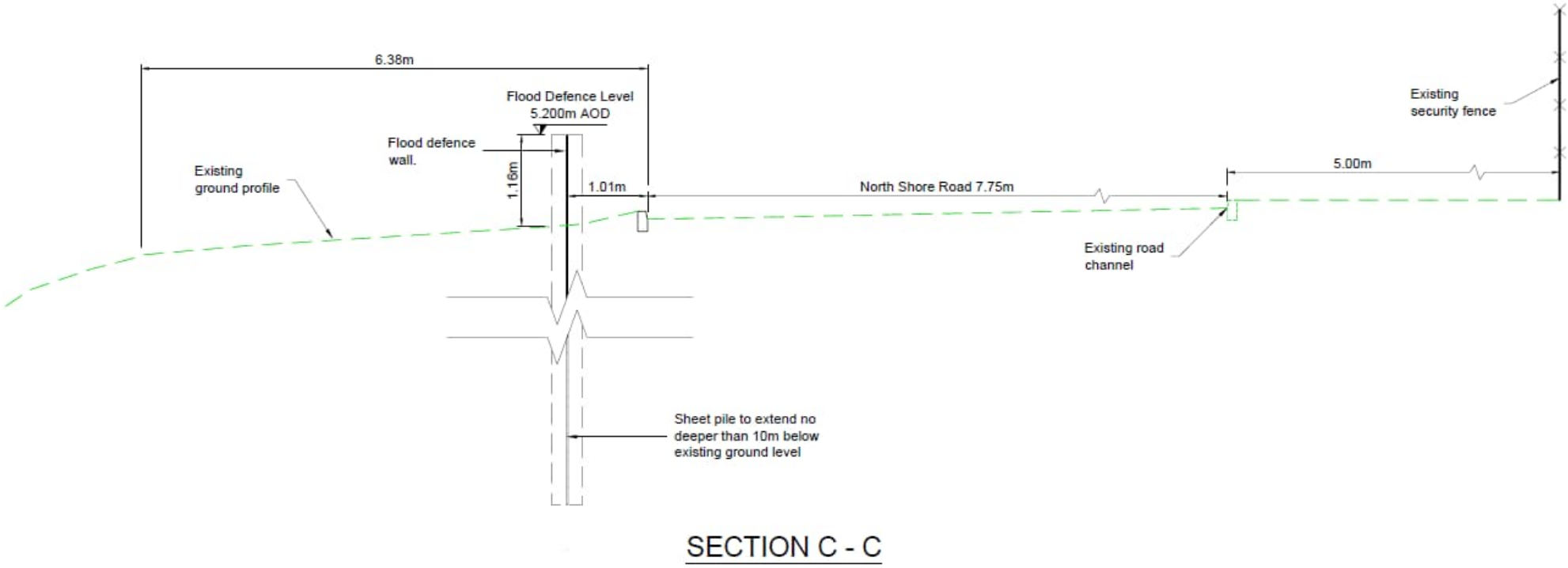

Figure 6 Typical X-section C-C along North Shore Road

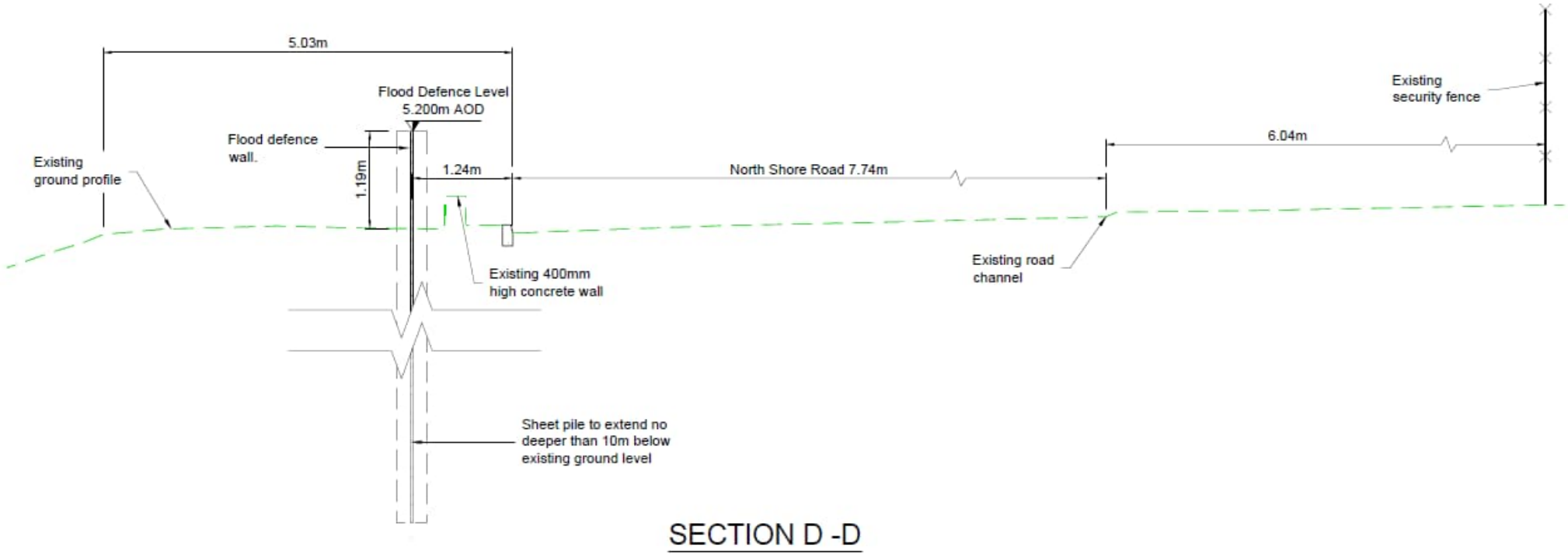

Figure 7 Typical X-section D-D along North Shore Road

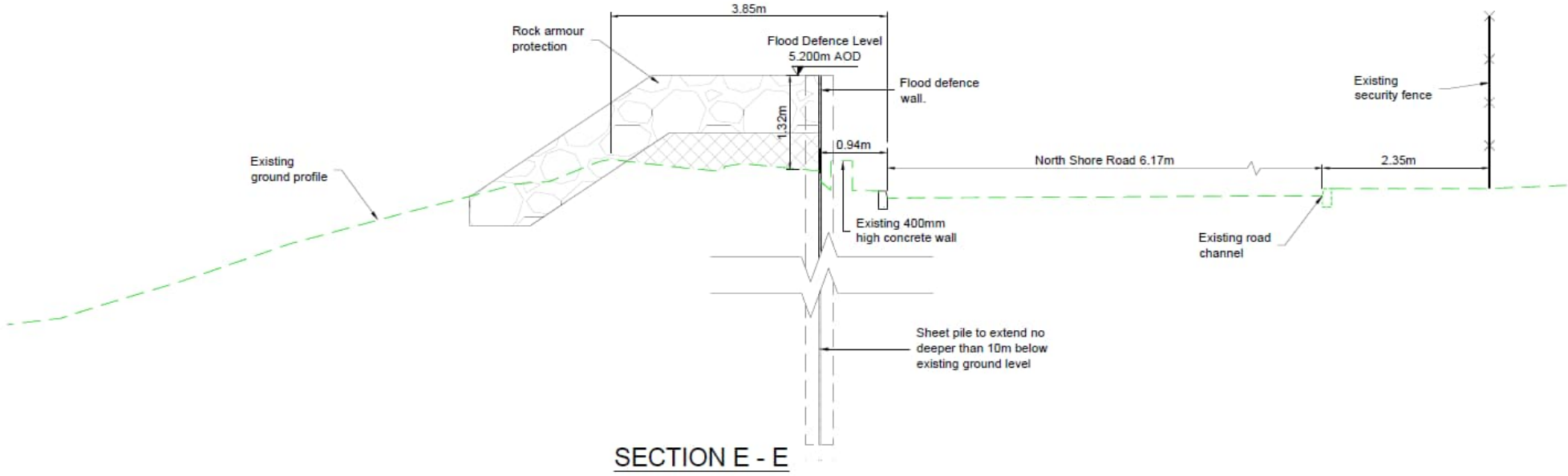

Figure 8 Typical X-section E-E along North Shore Road

Figures 4 to 8 show typical X-sections along North Shore Road, identifying the carriageway width, flood wall, small concrete wall and road-side verges.

Table 1 outlines the carriageway width along North Shore Road and the pre and post scheme obstruction free widths along North Shore Road. The obstruction free widths given in the table below are from the centre of the flood wall, the actual obstruction free widths would be ~0.3m smaller due to the profile (N-pan) of the sheet pile. The obstruction free widths are taken from the bank crest, potentially a wide load could over-hang the bank crest as there is no obstructions along the bank crest.

X-section Ref	Pre-scheme carriageway surface road) width (m)	Post-scheme carriageway surface road) width (m)	Pre-scheme obstruction free width (m)	Post-scheme obstruction free width (m)
A	10.28	10.28	15.74	11.28
B	7.54	7.54	22.10	18.96
C	7.75	7.75	19.13	13.76
D	7.74	7.74	18.81*	15.02*
E	6.17	6.17	12.37*	9.46*

*Assumes the existing small concrete wall is not an obstruction, due to its low height (0.40m high).

Table 1, Carriageway widths at various x-sections along North Shore Road

4. Discussion

The current minimum obstruction free width along North Shore Road at the pinch point on x-section E-E is 12.37m (not including the small concrete wall as an obstruction due to its low height). The post scheme minimum obstruction free width along North Shore Road is 9.46m (assuming the small concrete wall is not an obstruction). The post scheme obstruction free width is 2.91m smaller than the current obstruction free width (excluding the small concrete wall). If the small concrete wall is deemed to be an obstruction, the post scheme width is no smaller than the current width and the critical obstruction free opening width would remain as 9.22m.

In previous discussions, Forth Ports noted that previous oversized loads have used self-propelled modular transporters (SPMT's). We understand SPMT's can raise their load platform by up to 1.8m[1] from the ground (road) level. At no point is the proposed flood wall 1.8m high from the carriageway level on North Shore Road. Therefore, the proposed flood wall would not restrict or inhibit overside loads North Shore Road if the load was transported on SPMT's.

If a normal articulated lorry was used to transport an abnormal load, the height of the trailer is generally over 1.6m from the road to the trailer. If any pieces over-hung the lorry, a temporary frame could be positioned on the trailer to ensure any over-hanging pieces are raised above 1.6m from the carriageway.

[1] https://www.mammoet.com/equipment/transport/self-propelled-modular-transporter/spmt/