Grangemouth Flood Protection Scheme

Technical Note – Flood Defences at Dock Street Area

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Grangemouth Flood Protection Scheme

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Project Manager:	Alan McGowan
Author:	Richard Meeson
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CH2M HILL United Kingdom

95 Bothwell Street
Glasgow, Scotland G2 7HX
United Kingdom
T +44 (0)141 243 8000
F +44 (0)141 226 3109
www.jacobs.com

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1. Guidance to Readers

This Technical Note (TN) has been produced to assist and support the decision making process during the Outline design of the Grangemouth Flood Protection Scheme (the Scheme). There are multiple TN's for the Scheme and each TN focuses on identifying a recommended design solution for one specific location or area.

TN's are produced where there may be multiple design options for a flood defence solution, each within their own positive and negative impacts in relation to parameters such as Time, Cost, Social or Environmental disturbance, and are a means, within the design process, to help assess and refine those options.

The TN's should not be considered as full option appraisals, or should they have to meet the formal requirements of that process as outlined in "Options appraisal for flood risk management: Guidance to support SEPA and the responsible authorities", published by the Scottish Government in 2016. The TN's have been developed by members of the Technical Workstream and drafted in an open and transparent manner, with the principal focus of the TN being technical aspects. The TN's have been drafted using experience and professional judgement gained from working on other flood protections schemes in Scotland. Within the TN's any comparative assessment in relation to parameters such as 'time' or 'cost' , i.e. Low, Medium or High impacts, for any option, are relative comparisons measured only, unless specifically noted otherwise, against the alternative options contained within that specific TN.

The variation between a 'Low', 'Medium' or 'High' value is typically where the measure being compared is considered to have a difference in quantum which is judged to be significant enough to influence the decision making process for the options being assessed within each individual TN. There are no overarching threshold trigger levels between these categories which extend to all TN's, and a high-level comparison of these categories between other TN's shouldn't be carried out, what is a high cost option in one TN could very well be a low cost compared to options being considered in another TN.

Each TN has included a 'light touch' Equality Poverty Impact Assessment (EPIA), which is specific to the TN. A full EPIA will be carried out at key project milestones and recorded within Falkirk Council's systems.

Each TN will review the options being considered against the twenty Design Principles which have been developed to record and justify how the flood defence alignment has been determined by the project team. Not all the design principles will be applicable to all the options considered in the TN's, professional judgement will be used to determine which principles should be scoped out.

The recommended option identified for each TN, should be seen as an interim recommendation that will be subject to change once the 'next steps' are completed. Additional checks and reviews will also be undertaken as the outline design process is concluded prior to developing the scheme documents. It should also be noted that once any 'next steps' identified are carried out the TN will be subject to a further review to confirm the continued suitability of the recommended option or otherwise.

2. Introduction

This technical note outlines the flood defences that are proposed for the Dock Street area, which is in Carronshore, with a specific focus on the flood defences which are around the Riverside Stable complex (See Figure 1). This technical note will cover the following topics:

- Flood Risk
- Flood Defence proposals
- Opportunities and Constraints
- Recommendations
- Equality Poverty Impact Assessment
- Design Principles

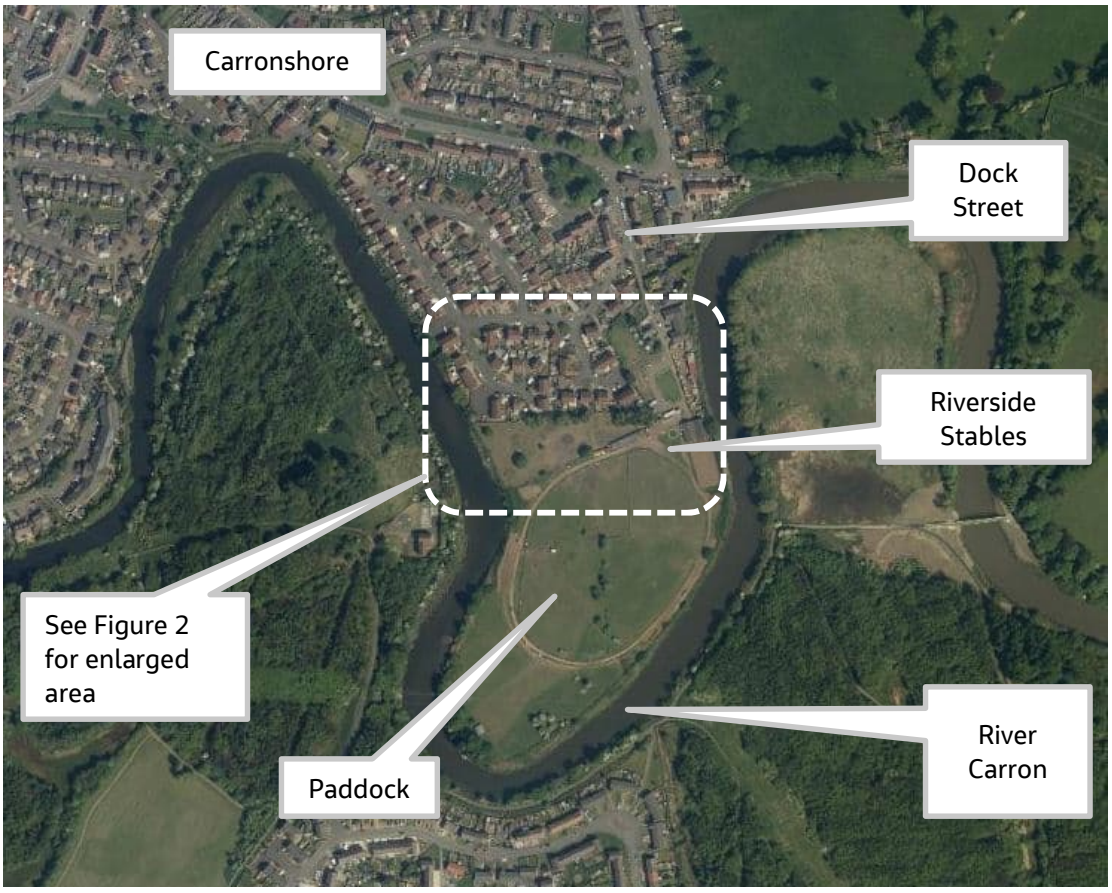

Figure 1 location covered in technical note

2.1 Site Description

Riverside Stables is a privately owned equestrian facility located at the south end of Dock Street in Carronshore. The Stable complex consists of a stable block building and several associated timber structures which also act as stables for livestock, or storage facilities for materials and equipment associated with the Stable business. There is an adjacent menege measuring approx. 40 x 20m located to the rear of the stable block, and an area of open ground within the property boundary measuring approx. 5.2 hectares which serves as a large paddock for grazing and equestrian pursuits. The river Carron flows west to east in a horseshoe shape around the land

forming the south, east and west property boundaries on with a private housing development bordering the land to the north. The Stables currently caters for up to 36 horses.

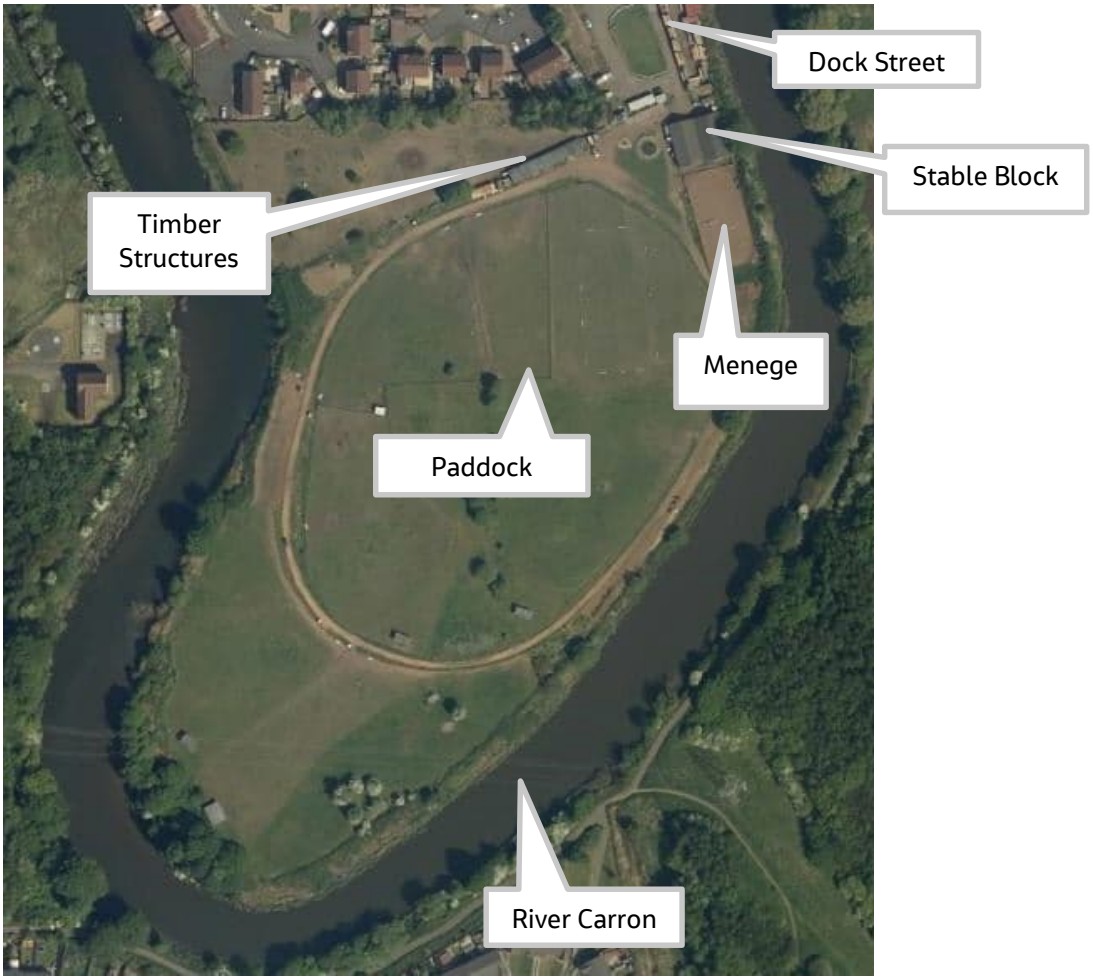

Figure 2 Riverside Stables

3. Flood Risk

The Riverside Stables and adjoining land are impacted by tidal flooding from the River Carron and lie within the tidal reach of the Forth Estuary

3.1 Baseline

The baseline 200-year water extent is shown in Figure 3. This highlights the area of Dock Street which is impacted along with several residential and commercial properties on both sides of Dock Street. The only access point into the Riverside Stables is, along with the main stable block building, below the floodwater level.

The Stable block building does not contain any residential facilities however the horses are housed in the building and would be at risk should a flood event occur at a time where no one was available to release them, access down Dock Street to the stable block would also be restricted at that time as Dock Street would be submerged by flood water.

There is also a risk to the properties on both Gilfillan and Wardlaw Place, whilst the 200-year event flood map in Figure 3 shows limited impact to the gardens of the properties. When including 'freeboard' the flood risk increases to a number of these dwellings.

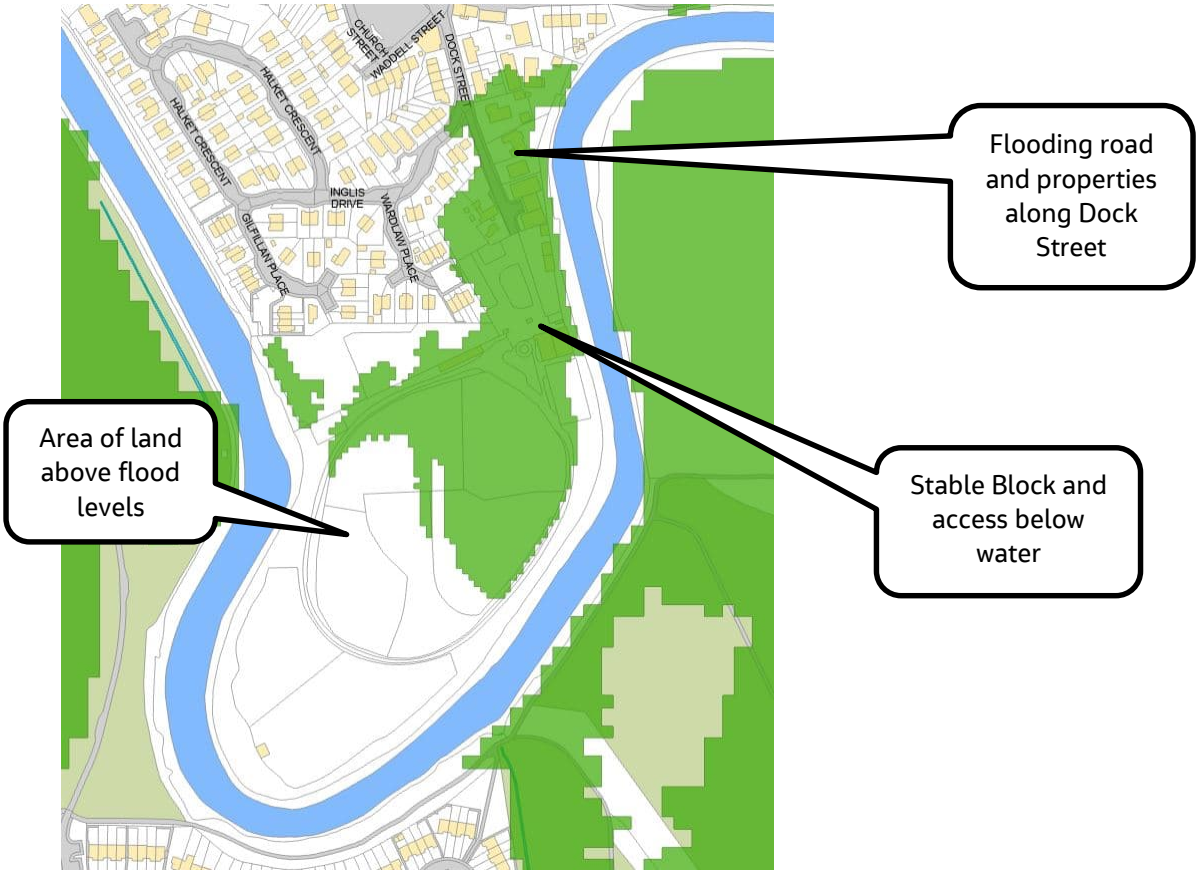

Figure 3 Baseline 200-year flood extents (tidal)

3.2 With Scheme

The scheme will prevent flood water flowing into Dock Street, which in turn will protect the properties that are currently at risk and will also protect the main stable block within the Stable complex. This will provide flood protection to the livestock without the need for human intervention and relocating them to an area of high ground. Any unplanned release could prove difficult and potentially dangerous and could occur at night or during a storm event.

It is not intended for the Scheme to protect the area of open ground which forms the paddock area which would be inundated by floodwater during a 50-year event, this area would remain at risk of flooding. To install flood

defences around the open ground area would remove a significant area of the functioning flood plain and be contrary to SEPA and Falkirk Council Planning Policy/Guidance. This has resulted in this option being discounted as a feasible alternative option and not worthy of further exploration or consideration.

The Menege would also remain at flood risk, it is acknowledged that this may have a negative impact on the surfacing material and lead to repairs or replacement being required after a flood event, however it is expected that this will be an infrequent occurrence (a 50-year event) and a relatively low-cost operation when compared to the additional cost of increasing the wall length to protect this area.

4. Flood Defence Proposal

4.1 Flood defence alignment

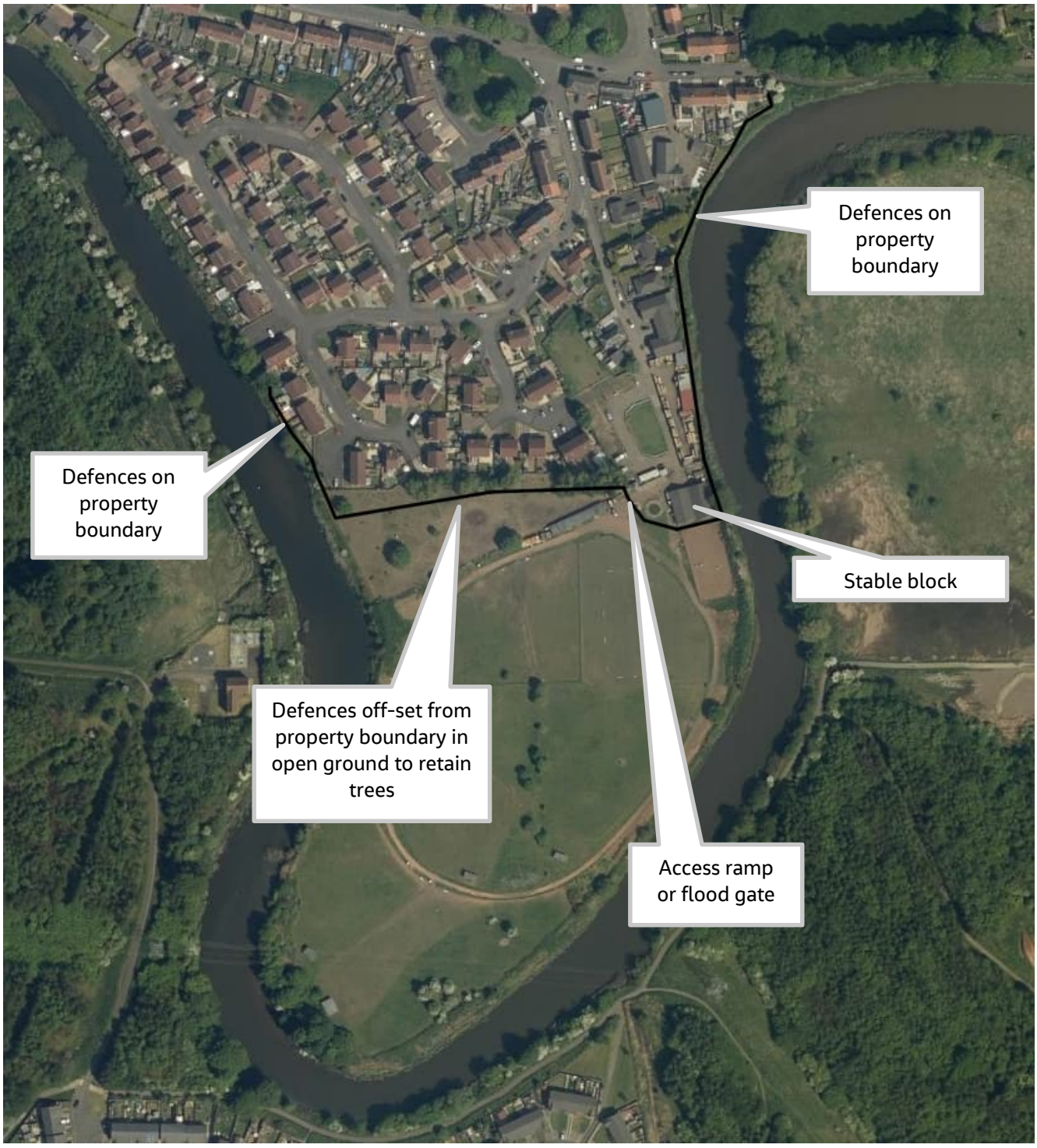

Figure 4 showing the flood defences on the northern edge of the stable complex and along the River Carron

Figure 4 outlines the proposed flood defences. The flood defences are approx. 260m in length and will likely have sheet piled foundations with a reinforced concrete wall stem above ground and be clad in brickwork. The short length of flood defence on the west side of the peninsula will run along the rear boundary of the properties on Gilfillan Place, at the top of the riverbank, it would then turn east and head through the north area of the stable complex in open ground at a suitable(5-10m) offset from the property boundary line. The flood defence then turns south and crosses the main access track in the Stable complex before wrapping around the rear of the

Stable block and turning north to continue along the edge of the River Carron on the rear boundaries of the Dock Street properties.

At the point where the flood defence must cross the access track (to the stable block from Dock Street) there will be a requirement for either a ramp or flood gate to ensure access over or through the defences is maintained. This crossing needs to be suitable for large vehicles (i.e. horseboxes), horses and pedestrians. An initial on-site assessment of the layout geometry and available space adjacent to the proposed crossing location suggests it may be possible to install a ramp, but this will require further investigation during detailed design. Initial discussions with the landowner indicated a preference for a flood gate due to the type of vehicles that access the land to the south of the defences.

Flood defence heights are shown in Figure 5.

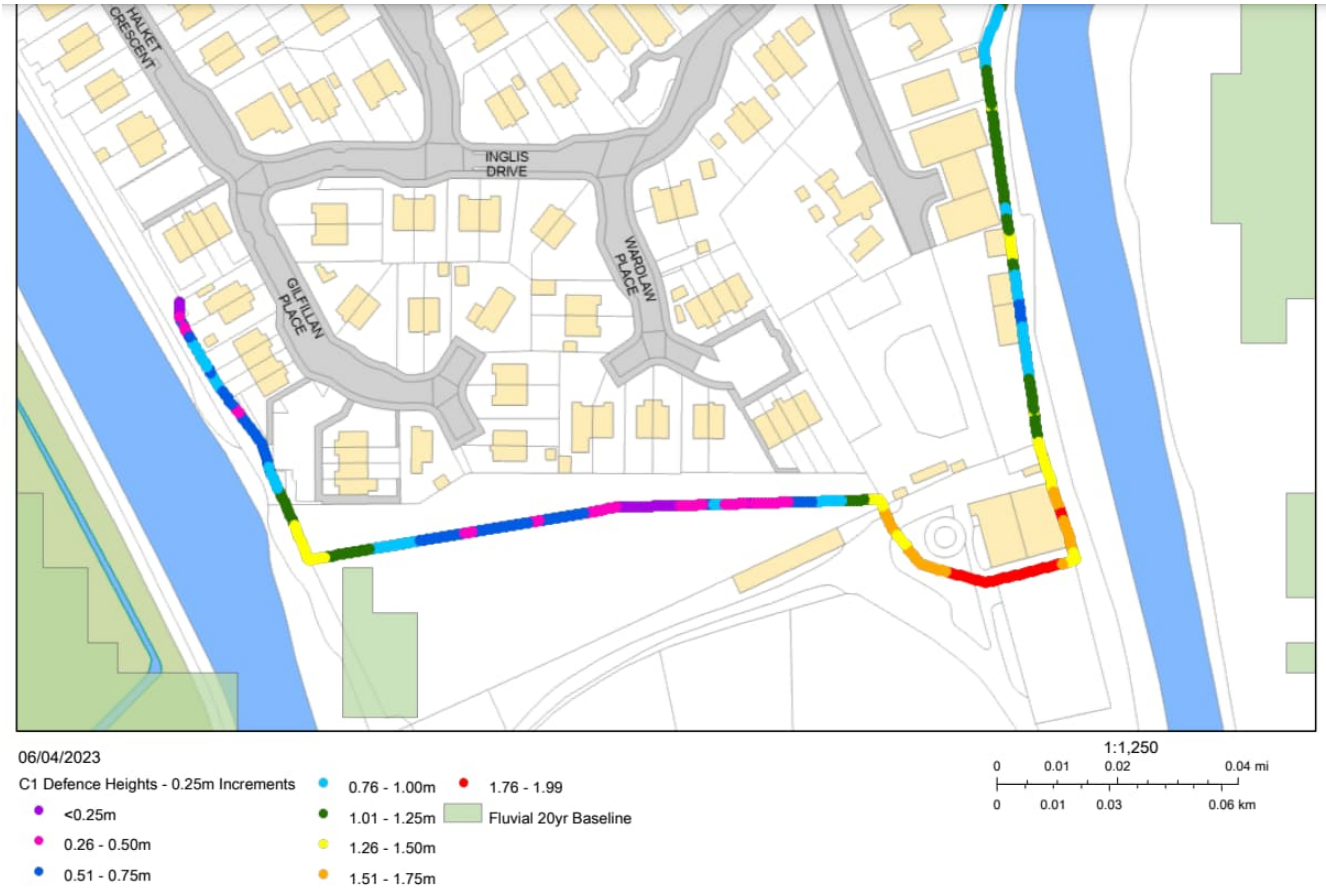

Figure 5 Flood defence heights

5. Opportunities and Constraints

The alignment detailed within this TN has been assessed, this is a single option solution with no alternatives that would provide reasonable comparison.

Options	Economic	Social	Environmental	Access/functionality	Residual Flood Risk	Comment
Flood defences	Low – based on standard construction costs with no specialist requirements or complex engineering solution required	Low – protection delivered to all residential and commercial premises, with Stable protection ensuring livestock are also removed from risk	Medium – some in river working platforms may be required on defences being proposed adjacent to River Carron	Low - requirement to cross flood defences likely to be delivered using a ramp rather than gate ensuring constant access availability during flood warning periods	Low – Flood risk removed all residential and commercial premises, with Stable protection ensuring livestock are also removed from risk. Undeveloped Paddock land remains as flood plain	Provides protection to residents, businesses and road infrastructure and ensures protection of livestock and stables infrastructure.

Table 1 Opportunities and constraints

6. Recommendations

It is recommended that the option described in this Technical Note should be progressed on the basis that:

- Properties and businesses on Gilfillan Place, Wardlaw Place and Dock Street. are protected from flooding.
- The main stable block where the horses are housed within the Riverside Stables is protected.
- Early discussions with the Riverside Stable owner, who also owns several of the commercial and residential properties on Dock Street, indicates they are supportive of the proposed solution. Continued engagement with them will be required throughout the notification and detailed design phases to limit the disturbance on the stables and residential properties.

7. Equality Poverty Impact Assessment

An equality poverty impact assessment (EPIA) is being undertaken at key project milestones. The EPIA contained within this technical note, will feed into the over EPIA for the project. The EPIA (Table) is high-level assessment that is bespoke to this technical note and in particular the flood defence Option described.

Protected Characteristic	Neutral Impact	Positive Impact	Negative Impact	Evidence of impact on protected characteristic
Age				Positive impact – reduces the flood risk to Dock Street, Gilfillan Place and Wardlaw Place, maintains access to the stables.
Disability				Positive impact – reduces the flood risk to Dock Street, Gilfillan Place and Wardlaw Place, maintains access to the stables.
Sex				No impact
Ethnicity				No impact
Religion/belief				No impact
Sexual Orientation				No impact
Transgender				No impact
Pregnancy/maternity				No impact
Marriage/Civil Partnership				No impact
Poverty				No impact
Health/community justice				No impact

Table 2 Equality poverty impact assessment for Option described

8. Design Principals

Table 3 outlines the scheme design principals, which have been developed to help the design team determine the alignment of flood defences.

Alignment Principles		Option
1	Protect existing buildings and infrastructure	✓
2	Avoid encroachment into sensitive environmental sites	✓
3	Minimise disturbance of existing riverbanks and coastline	✗
4	Retain existing undeveloped land/ flood plains	✓
5	Avoid in water working	✗
6	Avoid utility diversions	✓
7	Locating flood defence adjacent to residential properties and outside the residential property boundary to reduce the loss of private garden	✓
8	Locating flood defences out-with the operation areas of the petrochemical site	n/a
9	Retain passive resistance to embedded walls to reduce pile lengths	✓
10	Consider Loading, Form of Defence and Land Take	✓
11	Adopt solutions that minimise disturbance of contaminated soils	✓
12	Maintain a straight alignment where possible e.g., avoid frequent changes in direction	✓
13	Minimise the use of floodgates and demountable defences	✓
14	Maintain a consistent standard of protection	✓
15	Avoid tree felling and vegetation clearance	✓
16	Consideration of future maintenance and access requirements	✓
17	Ensure the residual pluvial flood risk is appropriately mitigated	✓
18	Ensure key transport arteries are resilient to a 200yr event	✓
19	Minimise impact on the road network	✓
20	Minimise impact on cultural heritage sites	✓