

Report to the Chairperson and Members of the Transportation Strategic Policy Committee

Liffey Bridges

There are nineteen bridges over the Liffey between Chapelizod and Dublin Bay serving pedestrians, vehicles and the LUAS . Ten of these bridges date from the 17th, 18th or 19th Centuries while five were constructed in the 20th century and four so far this century. The location of the bridges is shown on figs. 1 & 2 together with the date of construction of the current structure; additional information on each of the bridges is available on www.bridgesofdublin.ie

Bridge Inspections

Bridges like all structures deteriorate with time. It is therefore necessary to carry out inspections on a regular basis to determine the condition of the various elements that make up a bridge. Inspections can be classified into three types, Routine, Principal and Special.

Routine Inspection

Routine Inspections are carried out by staff from Dublin City Council's Environment and Transportation Department. These inspections are carried out periodically or on a reactive basis if a defect is reported to Road Design and Construction Division. The purpose of Routine Inspections is to:

- Ensure day to day traffic safety and serviceability
- Avoid or delay the development of structural deterioration (preventative maintenance)

Routine maintenance and cleaning works include activities such as patching of potholes in the pavement of the bridge deck , realignment of deformed railings , sweeping of carriageway , clearing of vegetation and cleaning of the bridge drainage system.

Principal Inspection

A Principal Inspection is a systematic visual check of all accessible parts of a structure and has the following purposes:

- To maintain traffic safety
- To evaluate the need for repairs
- To monitor changes in the condition of the whole stock of structures
- To monitor the performance of minor (routine) maintenance and cleaning

These purposes are fulfilled by regular inspections. During the inspections the following items are registered.

- The general condition of the structure and the condition of each of its components. The condition is rated from 0 (as new) to 5 (Dangerous/Failed)
- The type and extent of any significant damage
- The condition of routine maintenance.
- The need for a Special Inspection
- The need for repairs to be carried out before the next Principal Inspection
- The next year of Principal Inspection. This can vary from one to six years depending on the condition of the structure, the traffic and the expected rate of damage development.

As part of the Principal Inspection process, the inspector photographs and gives a condition rating, where appropriate, to each of the standard components of the structure as listed in Table 1.

Number	Component	Number	Component
1	Bridge Surface	8	Pier
2	Expansion Joints	9	Bearings
3	Footway/Median	10	Slab
4	Parapet / Guardrails	11	Beams
5	Embankment / Slopes	12	Riverbed
6	Wing Wall	13	Other elements
7	Abutment	14	Structure in General

Table 1 Structure Components

The condition rating is a figure from 0 to 5 according to the following guidelines:

- | | |
|---|---|
| 0 | No or insignificant damage |
| 1 | Minor damage but no need of repair |
| 2 | Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development. |
| 3 | Significant damage, repair needed very soon. |
| 4 | Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required. |
| 5 | Ultimate damage. The component has failed or is in danger of total failure, possibly affecting the safety of traffic. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures. |

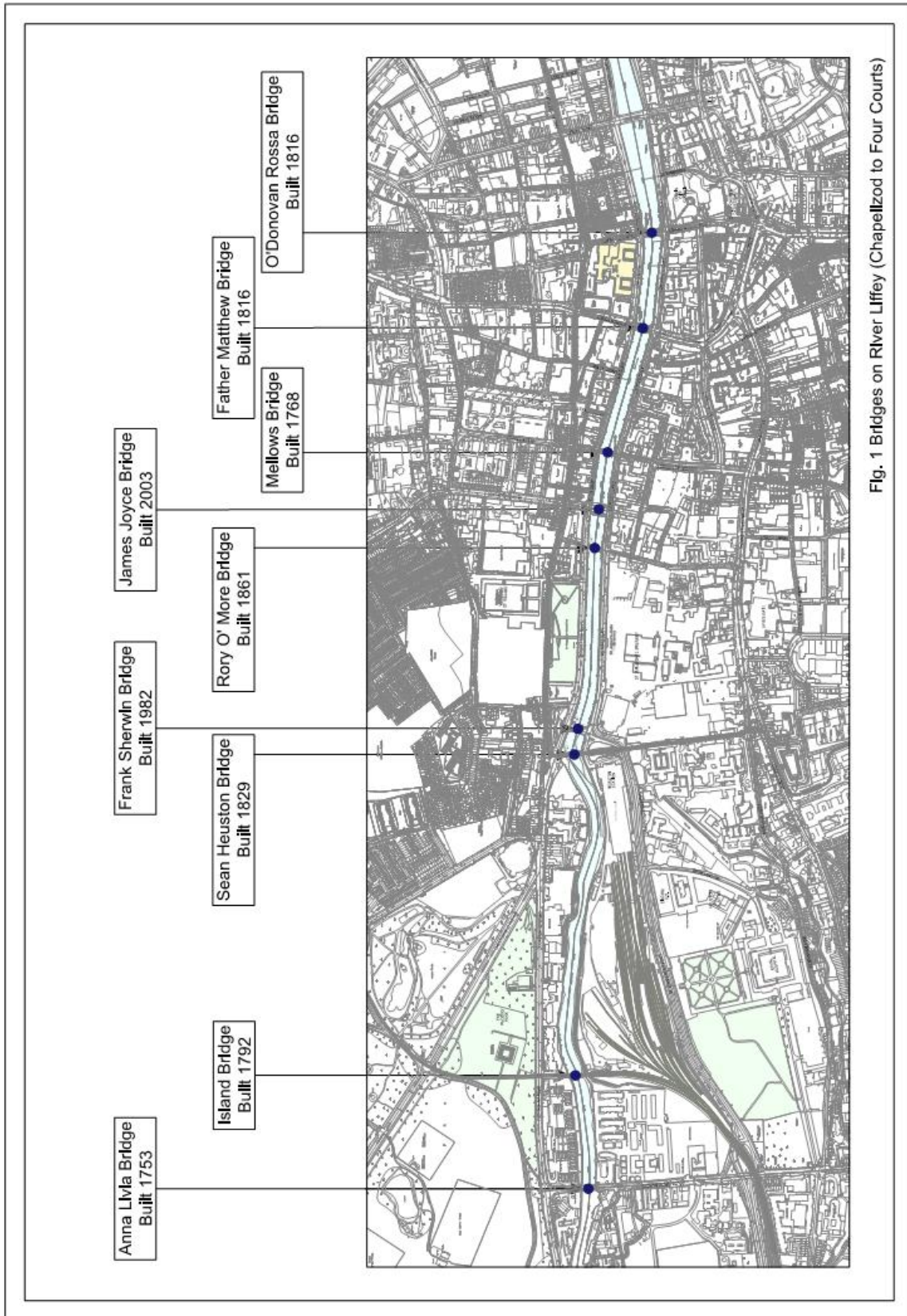


Fig. 1 Bridges on River Liffey (Chapellzod to Four Courts)

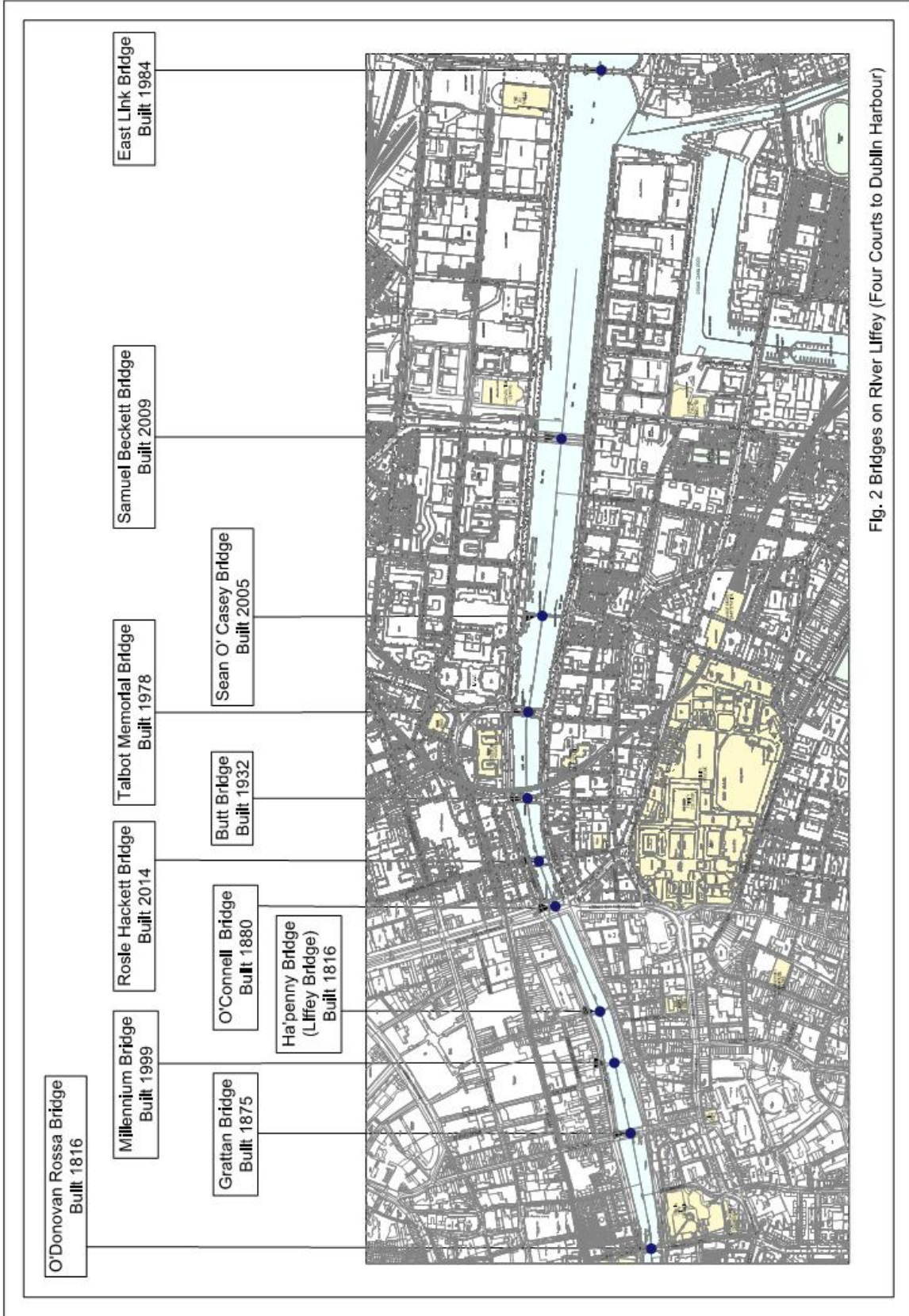


Fig. 2 Bridges on River Liffey (Four Courts to Dublin Harbour)

The condition rating of a structure includes the overall condition of the entire structure as registered under the final component numbered 14 above “Structure in General”. The condition rating takes into account which components are damaged, the type and the extent of damage, its expected development, and the influence the damage has on traffic flow. The condition rating “Structure in General” is not necessarily equal to the rating of the worst damaged component (because it may be a less important component). Neither is it necessarily the average component rating (because one very important component may have a rating much different from the average). The condition rating “Structural in General” may be described as an overall engineering judgement that takes into account the structure as a whole, and the influence of different factors.

In June 2014, Engineering Consultants were appointed to carry out Principal Inspections on 132 bridges and structures in Dublin City. These inspections have been completed and the reports have been submitted to the Environment and Transportation Department in recent weeks. The “Structure in General “ rating assigned to Liffey bridges following Principal Inspections carried out in 2011 and 2014/2015 are given in Table 2. These inspection reports will be used by the Road Design and Construction Division to prepare a prioritised works programme and a schedule of special inspections as required.

Bridge	Rating		Bridge	Rating	
	2011	2015		2011	2015
Anna Livia Bridge	2	2	O’Donovan Rossa Bridge	2	1
Island Bridge	3	2	Grattan Bridge	3	2
Sean Heuston Bridge	3	2	Millennium Bridge	2	1
Frank Sherwin Bridge	2*	2	Ha’penny Bridge	3	2
Rory O’More Bridge	3	2	O’Connell Bridge	1*	2
James Joyce Bridge	2	2	Butt Bridge	3	2
Mellows Bridge	2	1	Talbot Memorial Bridge	3	2
Fr. Matthew Bridge	2	1	Sean O’Casey Bridge	2	1

*Inspection 2008

Table 2 Principal Inspections “Structure in General “rating 2011 and 2015

Special Inspections

Following a Principal Inspection the inspector may decide that further investigation is required and will therefore recommend a Special Inspection. A Special Inspection as described by its name is not of a standard form and will be tailored to investigate specific conditions of the structure. Dublin City Council has recently advertised to appoint Consultants to carry out Special Inspections on the Talbot Memorial Bridge and Butt Bridge. The purpose of the inspections is to determine the condition of the bridges, assess the remaining service life of the bridges to enable a cost effective repair and maintenance strategy to be developed to extend the service life of both bridges. The Special Inspection for Butt Bridge requires the consultant to carry out work in two stages:

- Detailed visual inspection, condition testing, concrete coring, crack assessment, chemical analysis and test reinstatements.
- Prepare Final Report, drawings, interpretation of results and modelling of the remaining service life of the bridge and cost estimate for works.

In the case of Talbot Memorial Bridge, as it is a post-tensioned concrete structure, the Special Inspection requires the consultant to carry out the work in three stages:

- Detailed visual inspection, condition testing, concrete coring, crack assessment, chemical analysis and test reinstatements.
- Post –tensioning system duct and tendon exposures including testing and investigation within the ducts
- Prepare Final Report, drawings, interpretation of results and modelling of the remaining service life of the bridge and cost estimate for works

The above system of bridge inspection has assisted Dublin City Council in identifying where critical repair or refurbishment works are required. In the past number of years significant works have been commissioned on the following bridges: Blackhorse Bridge, La Touche Bridge, Annesley Bridge, Leeson Street Bridge, Cross Guns Bridge, Grattan Bridge, Ha’penny Bridge, General McMahan Bridge Fairview Pedestrian Bridge, Beaver Row Footbridge (works currently underway).

Future Bridges

One of the main areas within Dublin’s city centre for future development is the Docklands area. The North Lotts and Grand Canal Dock Planning Scheme was published last year and highlighted the need for the development of good quality pedestrian and cycling infrastructure within the area due to the limited scope within the area to provide for additional private car travel. The Planning Scheme states “that two pedestrian/cyclist bridges across the Liffey are crucial to improving connectivity within.... the area as a whole. They will also play an important role in making the best use of existing infrastructure, providing improved linkage to DART on the Southside and LUAS on Northside.” The locations of the proposed bridges are near 1) Forbes Street/Park Lane and 2) Benson Street/Castleforbes Road and are shown on fig. 2.

Dublin City Council recently invited tenders from Consultants to participate in a *Multi Party Framework Agreement for the Design Team Services for opening bridges in the Dublin Docklands Area* . Seven tenders were received and these are currently being assessed. In addition to using this tender to appoint Consultants for the above mentioned pedestrian and cyclist bridges, it is planned to use the Framework Agreement to appoint design teams for the proposed opening bridge over the Dodder at its confluence with the Liffey.

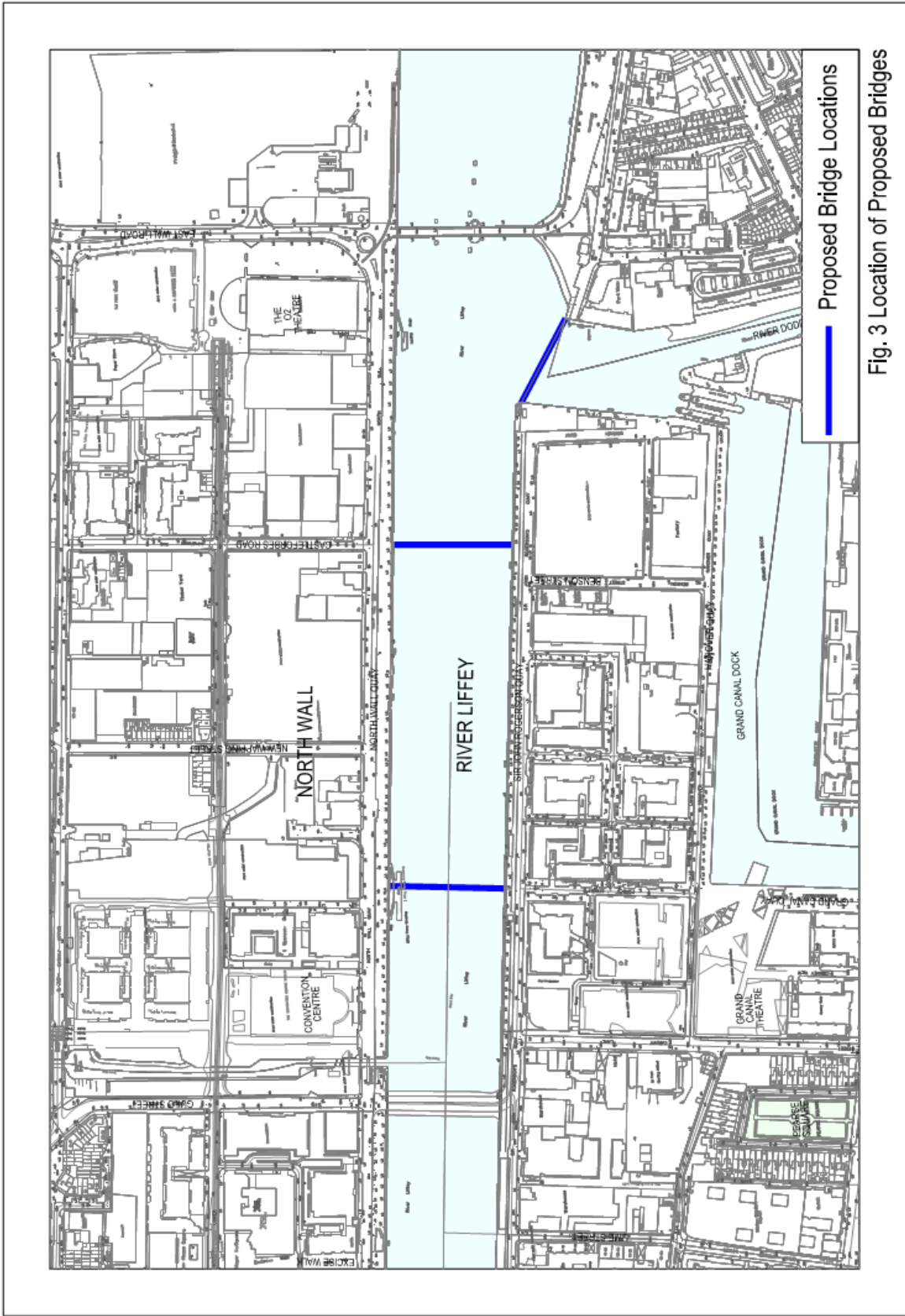


Fig. 3 Location of Proposed Bridges

Ronan O’Dea, Senior Engineer, Road Construction. September, 2015.