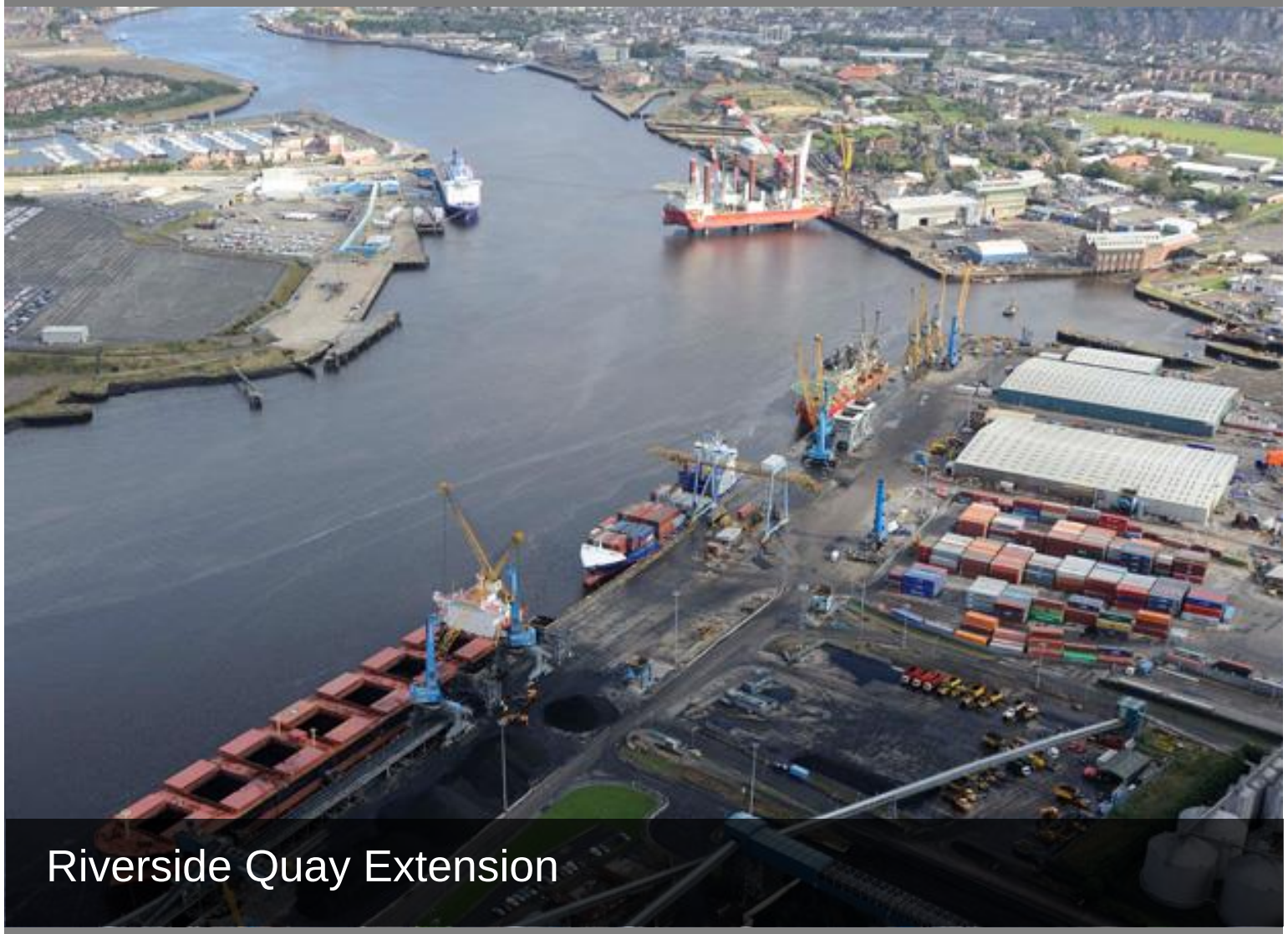

Riverside Quay Extension

Discharge the remaining Planning Conditions for Extension to Riverside Quay
(Application Number: ST/0098/13/FUL)

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SOUTHBAY
CIVIL ENGINEERING

Discharge the remaining Planning Conditions for Extension to Riverside Quay (Application Number: ST/0098/13/FUL)

TABLE OF CONTENTS:

SECTION 1: INTRODUCTION TO REPORT/DOCUMENT

The following report /document shall be submitted to South Tyneside Council (The Local Authority) in respect to the Planning Application and conditions applicable to the 'Riverside Quay Extension'. Previous communication on behalf of The Port of Tyne Authority (The Client) and The Local Authority has been documented and liaised. There are eight (8) conditions applicable to the scheme to which there are two (2) remaining conditions to be discharged.

Southbay Civil Engineering Ltd (The Principal Contractor) has been awarded the Riverside Quay Extension contract on behalf of The Client. It is the responsibility of The Principal Contractor to submit a package to allow successful discharge of the remaining conditions.

The remaining conditions are:

4. Noise
No works shall commence on site until the hours of construction have been agreed in writing to the Local Planning Authority. The agreed details must then be strictly adhered to unless the prior written approval of the Local Planning Authority has been obtained.

In the interests of safeguarding nearby residents from undue disturbance from construction works in accordance with the applicants Riverside Quay (Eastern) Environmental Statement January 2013 and South Tyneside Local Development Framework Policies EA5 and DM1(B).

5. Piling
No works shall commence until the piling methodology and schedule has been agreed in writing by the Local Planning Authority. A noise assessment, with an associated scheme of monitoring for compliance shall be provided for the piling works and shall include calculations to assess the exposure of the nearest sensitive dwellings, including Commercial Road (Thornton Avenue) and Captain's Row. Noise levels calculated shall include 1 hr LAeq and LAmax values. The agreed details must then be strictly adhered to unless the prior written approval of the Local Planning Authority has been obtained.

In the interests of safeguarding nearby residents from undue disturbance from construction works in accordance with the applicants Riverside Quay (Eastern) Environmental Statement January 2013 and South Tyneside Local Development Framework Policies EA5 and DM1(B).

This report shall adequately detail, explain and describe the intended works which fall into the above two conditions.

SECTION 2: CONSTRUCTION ACTIVITIES GENERATING NOISE

The construction of the proposed Riverside Quay Extension is diverse and holds vast detail of technical input from various construction methods and sequence. However there are two (2) main activities which are governed by conditions Four (4) and Five (5). The construction activities most susceptible to the conditions are;

1. Importing stone (Engineering Fill, Class 6A & 1A Material) by Sea (Vessel)
2. Piling. Extensive installation of steel tubular piles

Notwithstanding the above, generic construction activities will be present during the Riverside Quay Extension however cause significantly less impact to the local residents and surrounding areas in relation the applicable conditions.

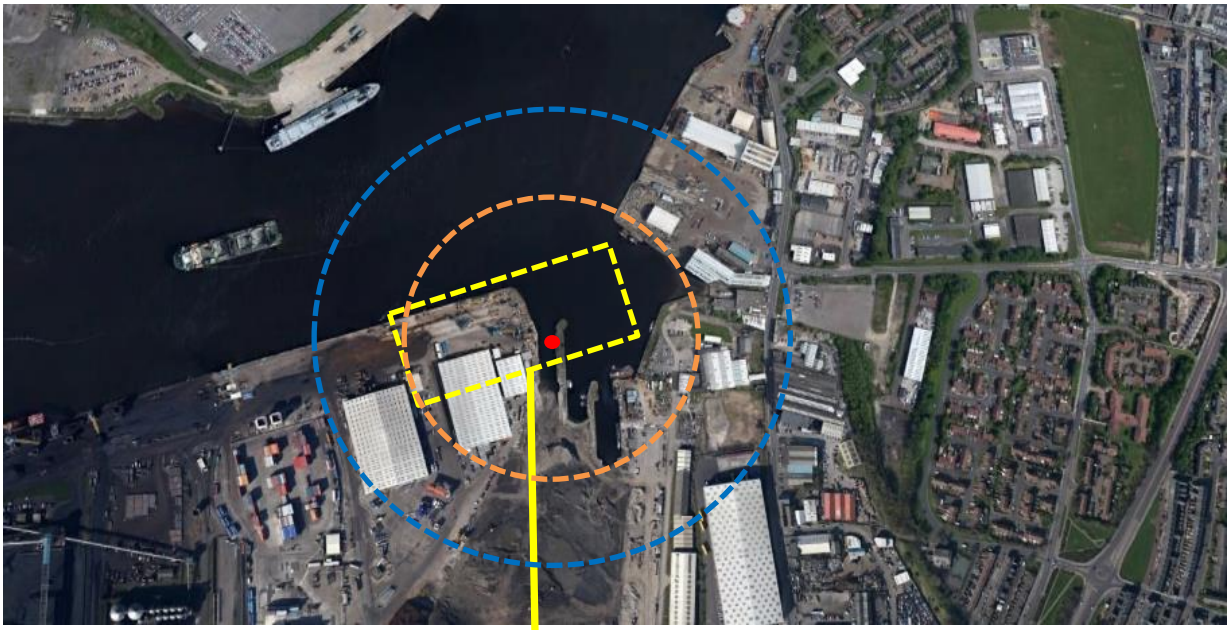
SECTION 3: IMPORTING AND DISCHARGE OF STONE

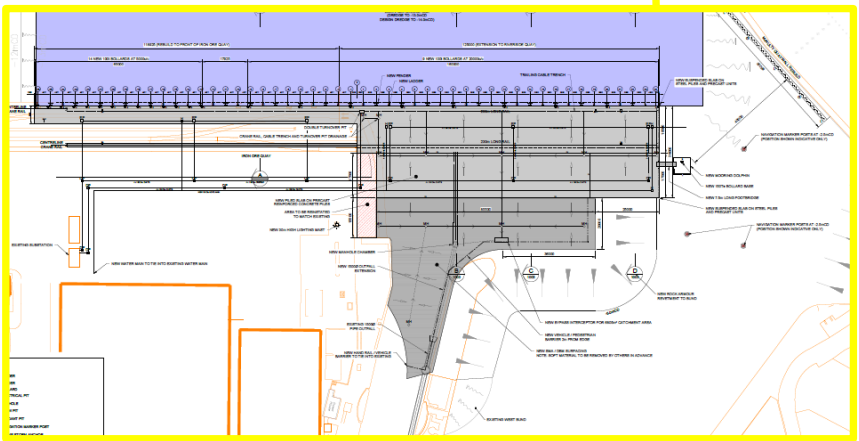
The scheme involves in the region of circa 115,000 tonnes of engineering fill (6A and 1A Stone Fill) to create the proposed 'West Bund' which will be constructed behind a new retaining wall which in turn will become part of the proposed Riverside Quay Extension. The Principal Contractor has proposed to import this 'Stone' from a seagoing vessel supplied by that of Stema.

Stema are able to provide vessels which accommodate a quantity of 33,000 tonnes, however due to logistical restrictions set on the River Tyne and existing bed levels the vessel(s) will import and deliver 28,500 tonnes per shipment. This reduction in quantity reduces the draft of the vessel and satisfies the Port of Tyne Harbour Master. Stone will be delivered in four shipments, each load will be approximately 28,500 tonnes. The vessels carrying the stone will also discharge via the on board conveyor.

It is proposed to import and discharge a minimum of Two (2) vessels directly into the West Bund location.

Figure 1: Illustration detailing location of discharge into the 'West Bund'.





Key:

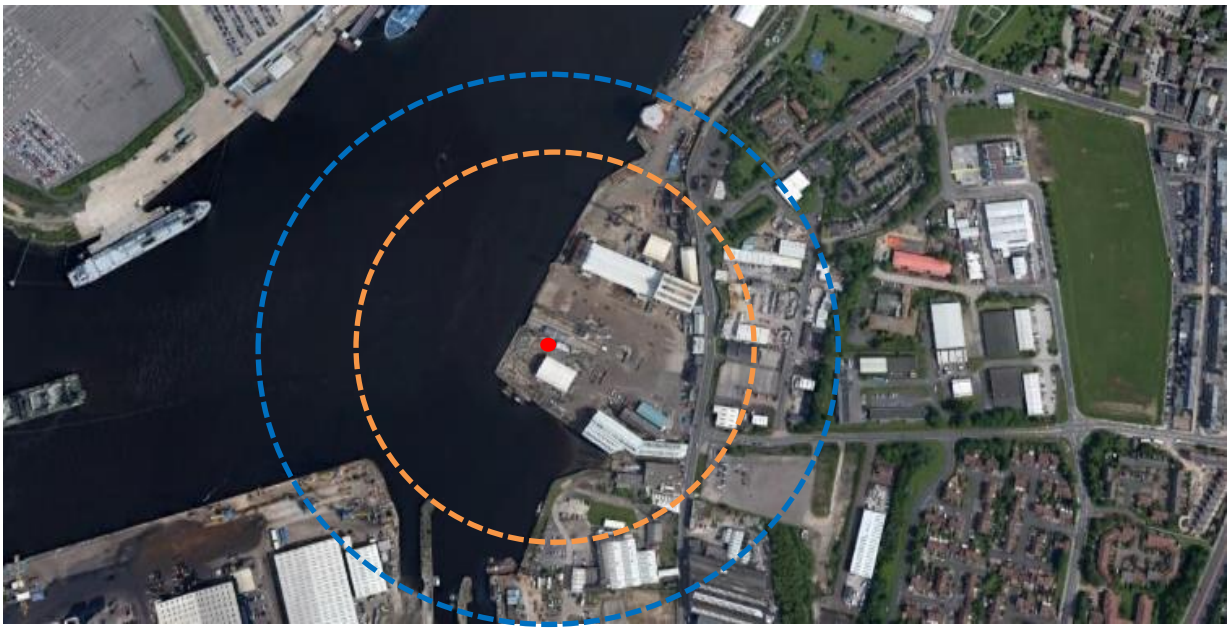
Point of Discharge

200m Radius

300m Radius

The remaining Two (2) vessels will be discharged onto the existing Quay of McNulty Yard. Then at a later date transported by plant and machinery to the 'West Bund'.

Figure 2: Illustration detailing location of discharge onto the existing Quay at McNulty



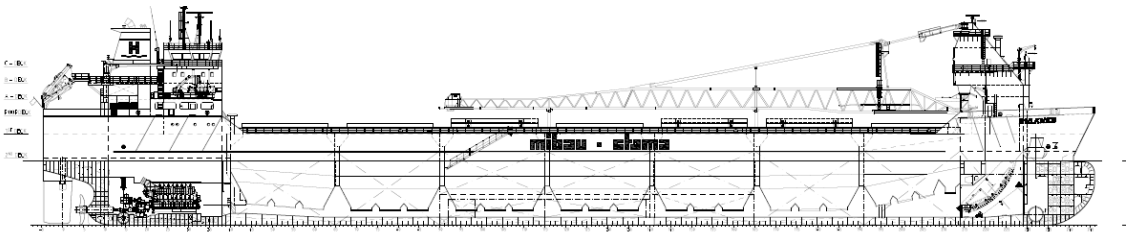
Key:

Point of Discharge

200m Radius

300m radius

Figure 3: Illustration of Vessel (Bulknes) Cargo hold Capacity of 33,000 tonnes and conveyor length of 79m



During the selection process of the imported stone, the Principal Contractor negotiated and clarified queries in relation to the applicable conditions held by The Local Authority. To mitigate and reduce the noise of the operation the following enforcements are set to be in place:

1. The conveyor at the point of discharge will be lined with 'rubber matting'. This rubber lining will mitigate the noise of the stone being propelled against the metal conveyor hopper.
2. The stone size is 0-100mm in particle size and therefore carries less noise upon discharge as opposed to larger stone.

3. Direct discharge into water (West Bund Location), which will mitigate the potential noise if discharged onto ground.
4. Direct discharge on to McNulty Quay, West of the existing large shed. The shed will provide acoustic protection to Commercial Road and Captain's Row.
5. At the Principal Contractors request, Stema have conducted noise assessments on a site situated on the River Thames. This noise assessment identified that at a 250m radius the maximum noise level was 41db. This assessment was carried out over an approximate duration of 10 minutes.
6. The conveyor will be kept to a close distance (as low as practicable) to the ground/sea to minimise the 'drop noise' of the stone.

It is proposed by the Principal Contractor that the import and discharge of the stone will occur between the hours of 7am and 7pm, however during this activity the Principal Contractor will carry out noise monitoring for Peak, LAeq and LAmax values at 1 hour and 10 minute intervals. Based on the readings it will be the Principal Contractors intention to increase the 7am to 7pm restriction to an unlimited hour restriction based upon the noise monitoring regime and results of such noise generated.

The vessel can discharge the stone at a rate of 1,800 tonnes per hour. Therefore based on the vessel load of 28,500 tonnes the duration will be a maximum of 16 hours.

Figure 4: Example of Timeline/methodology of Stone delivery (Note could vary due to tidal movements, vessel would reuire to berth during high tide).

Day -3:	Gain availability and berthing windows with PoTA and Harbour Master
Day -2:	Confirm and place order with Stema for the delivery of 28,500 tonne of stone
Day 1 @ 05:00:	Stema berth vessel and set up conveyor to discharge direct to West Bund or McNulty Quay
Day 1 @ 07:00:	Commence discharging of stone into West Bund at a rate of 1,800t per hour
Day 1 @ 19:00:	Stop discharging of stone (as per 7pm restriction)
Day 1 @ 00:00:	Complete discharging of stone (all 28,500 tonnes complete by 23:00 hrs)
Day 2 @ 07:00:	Restart the discharge and complete at 11:00 hrs

Note: During the commencement and at regular intervals noise monitoring will be in place. The Principal Contractor will carry out these readings at various locations (radius) from the point of discharge. These points will be as a minimum at the source of the noise (Point of discharge) or a near as practicable, an approximate radius of 100m and the boundary of the Port of Tyne Estates (approximately 285m from discharge).

SECTION 4: PILING ACTIVITIES

The proposed scheme at Riverside Quay is structured on carrying out the programme critical activity of Pile installation. There are various sections within the scheme which requires installation of piles.

Iron Ore Quay:	73 number Tubular Piles to install 100m of Sheet Piles to install
Riverside Quay Extension:	84 number Tubular Piles to install 170m of Combination Steel Pile Retaining Wall to construct 120m of Sheet Piles to install
McNulty Quay:	90m of Combination Steel Pile Retaining Wall to construct 90m of Sheet Piles to install

As set out in the Local Authority condition item number Five (5). The literature below will include;

1. Methodology
2. Noise Assessment and monitoring scheme/regime

1. <u>Methodology of Pile Installation:</u>

Existing Iron Ore Quay/Riverside Quay:
To install the piles through the existing quay, access holes in the quay will be created. The locations of the piles will be marked on site by the site engineer in accordance with the construction drawings. The existing quay will then be saw cut and broken out by excavators, care will be taken to minimise the amount of broken concrete that falls into the water. If required long reach excavators will be used to clear the river bed of large volumes of broken concrete. Once the holes have been broken out, the position of the piling gates will be marked on site by the engineer. The piling gates will be lifted by the crawler crane and place on top of the existing quay in the required position. The gates will be secured in position by drilling, pinning and installing wedges to prevent the gates moving. When secure cross beams will be welded to the piling gates at the required position to form a frame for installing the piles. Prior to installing the piles the frame will be checked for line by the site engineer and signed off ready for installation of piles.

<u>Figure 5: Typical detail of temporary works and piling through existing Quay Deck</u>

The piles will have pitching shackles with release lines attached to holes burnt into the top of the pile. The holes will be 40mm dia and the centre of the hole will be approximately 150mm from the top of the pile. The crawler crane will then lift the pile under the control of a lift supervisor and it will be pitched in the gate.

Figure 6: Photograph illustrating a Steel Tubular Pile being 'Pitched'

Once pitched the pitching shackles will be released and the vibro hammer attached to the crane. The vibro hammer will then be lifted and placed on top of the pile and driven till refusal. During the driving of the pile, it will be checked by the piling foreman for verticality, if required the pile will be extracted and re-driven.

Figure 7: Photograph illustrating a Vibro Hammer driving a Steel Tubular Pile

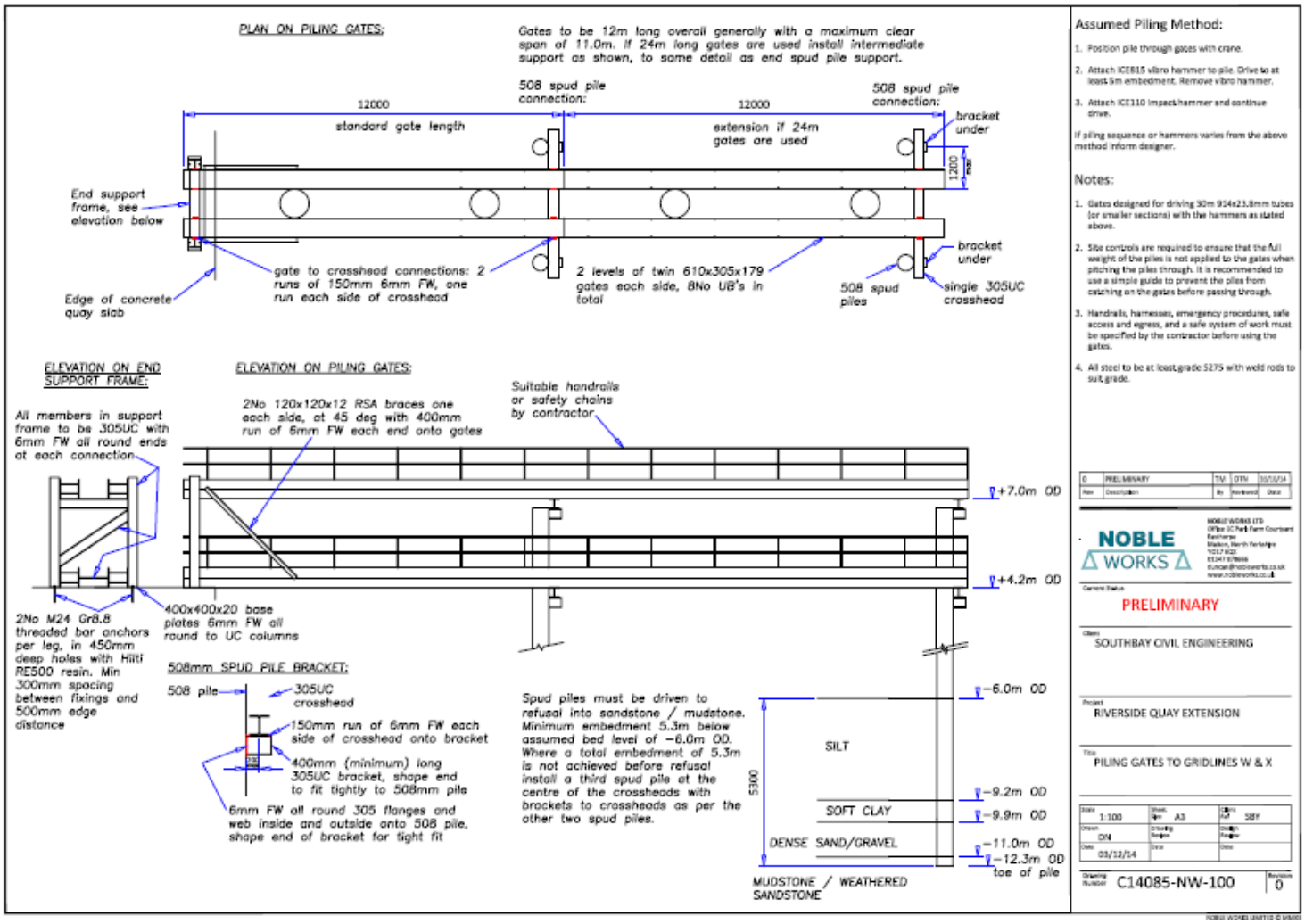
Finally the impact hammer will be used to back drive the piles to the correct 'set'. The site engineer will maintain records of the driving to ensure they are to the required 'set' and details will be forwarded to PTA. After all the piles have been installed the frame will be removed by the crane and placed at the next location.

Figure 8: Photograph illustrating an Impact Hammer driving and setting the Steel Tubular Pile to its design parameter.

Proposed Riverside Quay Extension:

Temporary 'spud' piles will be driven in the river at positions approximately 1.5m off the line of the permanent piles. The spud piles will be driven by lifting the pile and vibro hammer together and driving to approximately 10m depth as per the temporary works design. Piles will be positioned by the setting out engineer. The spuds will be driven to the correct level such that the previously fixed brackets are at the correct level to enable the gates to be placed. A double gate will be constructed, cross beams will be welded to the brackets then the piling gates will be placed onto the cross beams and the frame set to correct line before been welded in accordance with the temporary works design. The frame will be checked by the engineer for the correct line and the temporary works supervisor and be signed off prior to pile installation.

Figure 9: Detail of Temporary Works Design for Installation of Tubular Piles in Open Water.



The piles will be lifted as previously described and pitched in the gates and driven using the vibro hammer. The pile will then be driven again using the vibro hammer if required and finally back driven using the impact hammer. The top gate will then be removed and driven to the bottom gate which will then be removed, throughout the driving the pile will be checked for position and verticality. Finally the impact hammer will be used to back drive the piles to the correct set. The site engineer will maintain records of the driving. A set of approximately 10 blows per 25mm driving with a 9 tonne impact hammer will be required.

Pile cap plates are required under the crane rail on Iron Ore Quay. On completion of piles being driven, the piles will be marked by the site engineer for cutting and will be trimmed to the required level by a plater / burner using oxygen /

propane cutting equipment. The piles will be cut to the marks given by the site engineer however approximately 200mm of the pile will not be cut until the pile is ready to be lifted clear.

When the pile offcuts are ready to be lifted off, operatives will access the top of the pile to be removed in the man riding basket and attach the quick release shackles. Long lifting straps will be lowered to the floor from the shackles. The operatives will then be lowered to the ground and attach the straps to the crane block. The crane will then take the weight of the offcut and the remaining 200mm of pile will be cut. The offcut will then be lifted clear and placed in a designated lay down area.

The pile caps will be delivered to site pre-fabricated. Prior to lifting on the correct centre lines will be marked on top of the piles, the correct pile cap will then be placed on top of the pile at the correct line and level, note this might not necessarily be the centre of the pile. Once in position the pile cap will be welded in accordance with the construction drawings and specification.

Figure 10: Photograph of typical Pile Cap Detail.

Figure 11: Photograph illustrating typical Quay Construction.

2. Noise Assessment and monitoring scheme/regime

This section of the document is intended to allow the discharge of planning condition 5 as referenced below;

> 5 No works shall commence until the piling methodology and schedule has been agreed in writing by the Local Planning Authority. A noise assessment, with an associated scheme of monitoring for compliance, shall be provided for the piling works and shall include calculations to assess the exposure of the nearest sensitive dwellings, including Commercial Road (Thornton Avenue) and Captain's Row. Noise levels calculated shall include 1hr LAeq and LAmax values. The agreed details must then be strictly adhered to unless the prior written approval of the Local Planning Authority has been obtained.

Noise Assessment

An initial noise assessment has been undertaken using sound pressure levels provided by the manufacturers of the piling rigs to estimate the predicted noise levels at the nearest residential dwellings.

The sound pressure levels are as follows;

Vibro Piling – 83dB(A) at 10 meters

Impact Piling – 90dB(A) at 15 meters

The assessment assumes a worst case scenario with noise levels assessed on piling taking place at the end of the 100m extension to Riverside Quay; this brings the noise source closer to receptors.

Noise levels at four potential receptors have been assessed;

1. West Holborn Street – approx. distance from source 442m
2. Windmill Hill – approx. distance from source 445m
3. Raleigh Close (Captains Row) – approx. distance from source 482m
4. Thornton Terrace (Temple Town) – approx. distance from source 611m

The planning condition specifies that the predicted impact at both Thornton Avenue and Captains Row be assessed. Since the port has received complaints from residents of Windmill Hill and West Holborn Street recently these locations have also been incorporated into the assessment for completeness.

See Figure 12 below for the location of receptors.

The results of the assessment are shown in the tables below, however it should be noted that this assessment does not take into consideration any potential screening effects of existing building or local topographical features which are likely to bring noise levels down further.

Additionally daytime background levels (L_{A90} dB) are included and have been extracted from a previous BS4142 assessment completed by Parsons Brinkerhoff.

Vibro Piling

	Piling dB(A) at 10m	Distance from source (m)	Predicted noise level dB(A)	Daytime L_{A90} dB
West Holborn St	83	442	50.1	49
Windmill Hill	83	445	50	53
Raleigh Close (Captains Row)	83	482	49.3	50
Thornton Terrace	83	611	47.3	58

Impact Piling

	Piling dB(A) at 15m	Distance from source (m)	Predicted noise level dB(A)	Daytime L_{A90} dB
West Holborn St	90	442	60.6	49
Windmill Hill	90	445	60.6	53
Raleigh Close (Captains Row)	90	482	59.9	50
Thornton Terrace	90	611	57.8	58

Conclusion

The date above suggestes that the noise arising from vibropiling is at or below background. The noise arising from stages of impact piling is predicted to add around 10 dB over background.

The principle contractor has considered potential options such as bored or augered piling however these options were considered not viable over water without initially installing a casing through vibratory methods. This technique would lead to significant volumes of waste which would need to be captured and disposed onshore. This process would also slow the production rate and increase the risk of material being deposited in the river. Displacement augered piles are not feasible in the ground conditions at the site as there is a 10m fracture running through the site requiring the use of 30m piles to hit competent rock. The required construction period for installing bored or augered piles (replacement or displacement) would also not allow construction to achieve the Port of Tyne schedule for operation of the new facility. The chosen technique is considered on balance as the only viable one.

Figure 12: Noise assessment and monitoring locations.

Monitoring Regime

The Principal Contractor holds extensive knowledge in the installation of steel piles and also construction of suspended quays. As such the Principal Contractor has previously undertaken noise monitoring on an environmentally sensitive scheme in 2009 (North Shields Fish Quay). A similar noise monitoring scheme/regime will be adopted on the Riverside Quay Extension to what was used at North Shields Fish Quay.

The proposed noise monitoring will include initial base readings at the proposed monitoring locations as detailed above (Figure 12) prior to any piling operations.

During the piling operation the Principal Contractor will carry out noise monitoring for Peak, LAeq and LAmax values at 1 hour and 10 minute intervals and gain adequate records for noise during piling operations.

Note that during the piling operation and methodology there are various sequences when installing Steel Piles, these are;

1. Pitching the pile
2. Driving the Pile with a Vibrating (Vibro) hammer
3. Driving the Pile with an Impact Hammer (also known as 'Backdriving')

Throughout the sequences above there are various impacts with regard to noise. During item 1 above no plant or noise is generated in pitching the pile. Machinery (ie, Crane) will be utilised to pitch the pile. Item 2 will require a Vibro hammer to vibrate the pile to refusal; this operation generally drives the pile through the loose ground (silts, sands, clay and mudstone) until refusal. On occasion the vibro may hit refusal at a higher level due to an unforeseen obstruction. Item 3 will require an impact hammer to drive the pile into the bed rock and set to the design perimeter.

Piling operations can be a lengthy operation in relation to pitching, setting verticality and initially using the Vibrating hammer to drive and set the pile in its vertical or designed state, to which the noise when performing the mentioned tasks are minimal. The last remaining sequence when driving and setting with an Impact Hammer ('back driving') can take on average 20 minutes per pile, during which this is most prone to noise.

Please refer to Annex A (North Shields Fish Quay Noise Monitoring). Annex A illustrates the results of the Principal Contractor noise monitoring. These results are illustrating the following;

Note: The noise monitoring station was located approximately 25m from piling activities and moved parallel (West to East) as piling progressed.

Piling Operation	Noise Reading	Distance of Reading
Vibration (Vibro) Hammer	80.9 dB	25m from source of Piling
Impact Hammer	92dB	25m from source of Piling
Impact Hammer	109.7 dB	4.7m from source of piling

ANNEX A: PREVIOUS PRINCIPAL CONTRACTORS NOISE MONITORING (NORTH SHIELDS FISH QUAY)

North Shields Fish Quay was to design and construct a new operational suspended quay situated 10m from commercial and residential properties, the Principal Contractor carried out the following a noise monitoring regime, which included taking noise reading adjacent to the piling activity. As the piling progressed from West to East the Noise Monitoring location moved in a parallel sequence. In the near vicinity to the scheme were residential apartments, restaurants and commercial properties.

Figure 1: Location of Noise Monitoring during Piling Activity

Key:

Site Boundary and location of extensive piling works

Monitoring Point (Ropery Steps)

Monitoring Point (P25)

Note: The approximate distance from the monitoring point at 'Ropery Steps' and piling operation is 25m.

Figure 2: Readings and information of noise during piling activities

Date	Pile No.	Vibro / Impact	Location of Reading	Resultant dB
07/12/2009	24	Vibro	Ropery Steps	80.3
	23	Vibro	Ropery Steps	80.4
	24	Impact	Ropery Steps	91.8
08/12/2009	25	Vibro	Ropery Steps	80.2
	23	Impact	Ropery Steps	91.7
	25	Impact	Ropery Steps	91.5
09/12/2009	23	Impact	Ropery Steps	91.8
	24	Impact	Ropery Steps	91.7
	26	Impact	Ropery Steps	91.9
	27	Impact	Ropery Steps	92.0
10/12/2009	17	Vibro	Ropery Steps	80.6
	18	Vibro	Ropery Steps	80.9
14/12/2009	20	Vibro	Ropery Steps	80.0
	20	Impact	Ropery Steps	90.2
	17	Impact	Ropery Steps	90.7
15/12/2009	22	Impact	P25 (4.7m)	109.7
	22	Impact	P28 (10.8m)	103.6
	22	Impact	P31 (15.6m)	101.5
	5 min Traffic Survey Max dB			94.1

ANNEX B: SCHEDULE OF PILING

Attached is contract programme 'RSQE Contract Programme Rev C 25.11.14'. Detailed within the programme are specified activities highlighted in 'Dark Blue' which indicate the piling activities throughout the scheme.