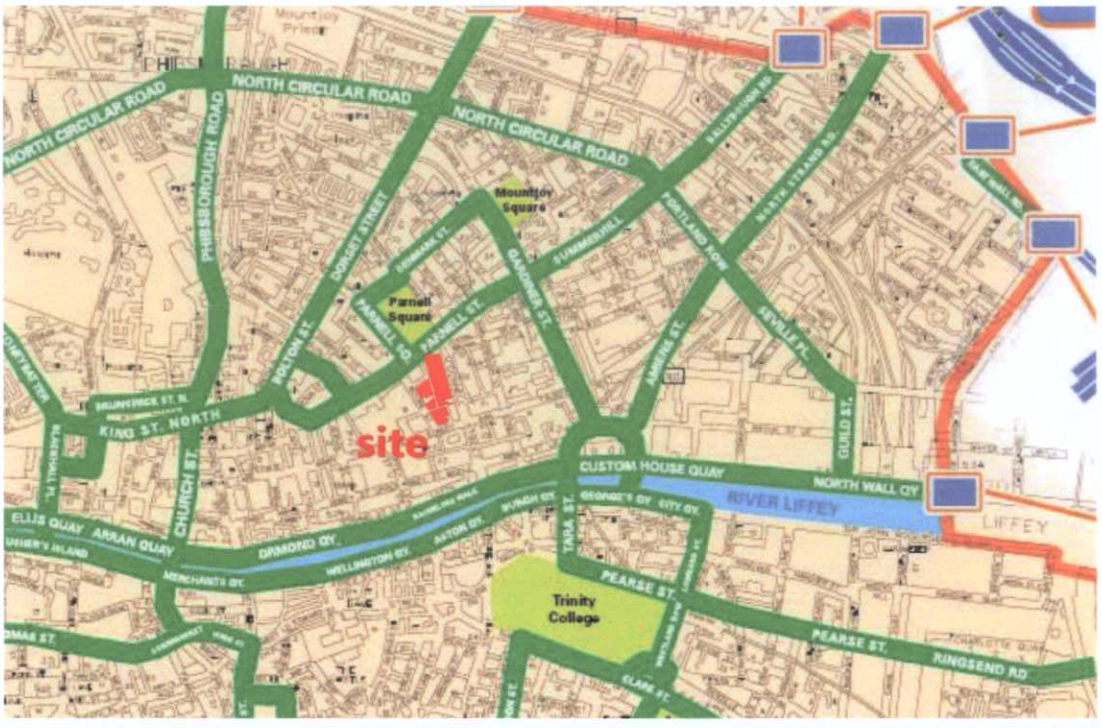

Figure 13.22: Designated HGV Routes in the City Centre.

Figure 13.23: Emerging Haul Routes for Construction Traffic (Inbound in green and outbound in red).

13.5.1.1.6 Local Traffic Management

The local traffic management for construction vehicles in the area of the site has been based inter alia on the haul routes described above and a series of tracking checks carried out on the local roads and junctions using Autotrack.

Based on these constraints, a series of proposals for a number of differing construction scenarios was prepared. The scenarios were based on the project phasing from Figure 13.20 and the construction program from Figure 13.21.

Two alternative scenarios were developed in detail based on clockwise and anti-clockwise circulation around the block bounded by Moore Street, O'Rahilly Parade and Moore Lane.

The preferred option is the anticlockwise circulation included the local traffic management proposals presented in Figure 13.24. Inbound access for the majority of construction vehicles is proposed from Parnell Street to Moore Street / O'Rahilly Parade and outbound departures from Moore Lane to Parnell Street.

This preferred option was selected on the basis of a number of local constraints including: -

- The lack of a stacking lane on Parnell Street in advance of the left turn into Moore Lane should there be a delay entering Moore Lane for whatever reason.
- The restricted width of the left turn from Parnell Street around Conway's public house into Moore Lane which could cause delays due to the slow deliberate turning for vehicles across a busy restricted area.
- The relatively easy right (and left) turns from Parnell Street to Moore Street.
- The availability of a stacking area for the right (and left) turns from Parnell Street into Moore Street.
- Local traffic management on Moore Lane would require the presence of temporary traffic signals and/or flagmen at different locations and at different times to facilitate vehicles passing depending on the movements in progress.

Arrivals are proposed from Parnell Street via Moore Street and O'Rahilly Parade. Some limited departures are proposed to O'Connell Street Upper via Henry Street up to 11h00 after which Henry Street is restricted to pedestrians only. The remaining departures are proposed to Parnell Street via Moore Lane.

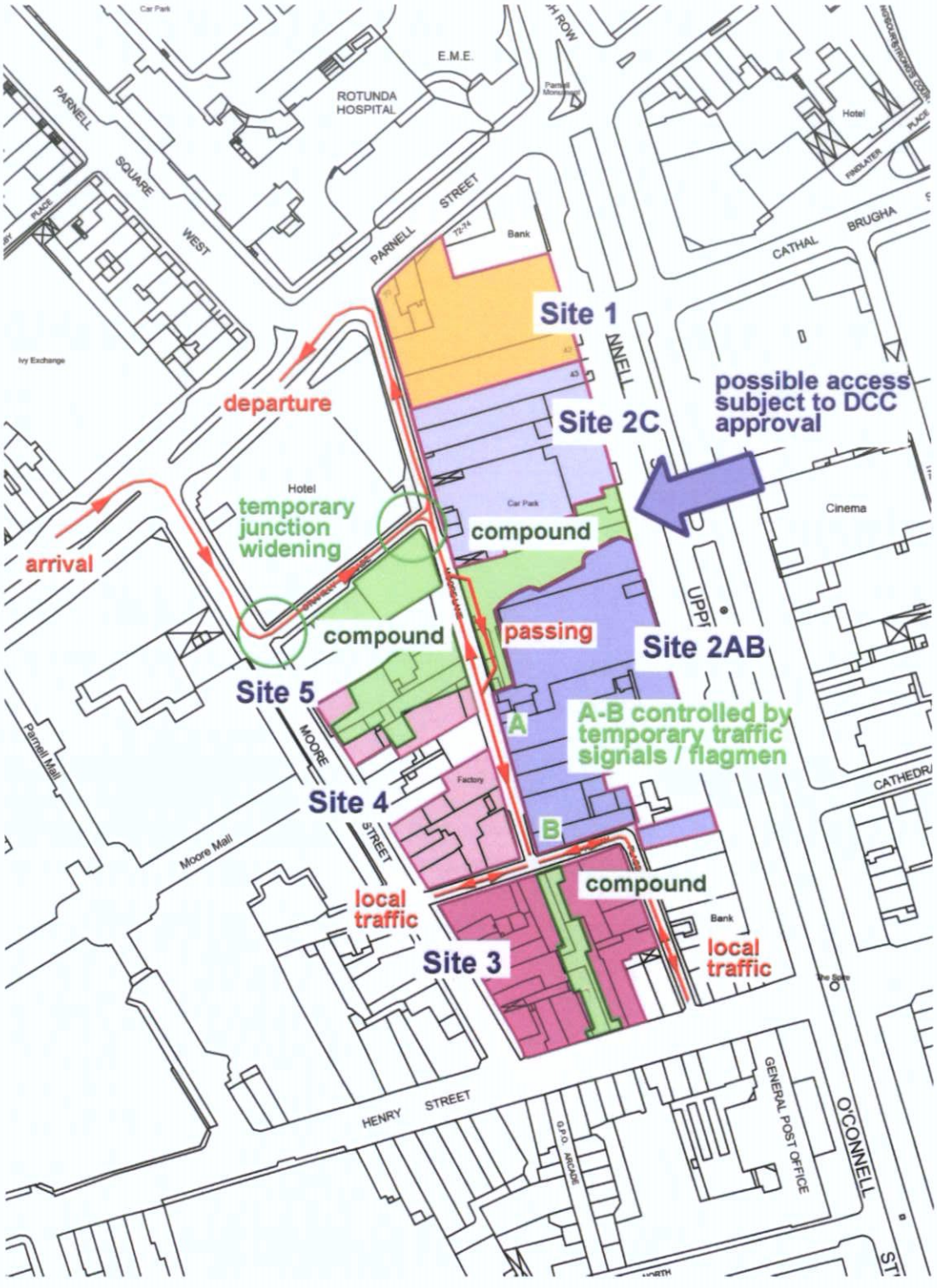

Figure 13.24: Construction Traffic Management.

13.5.1.1.7 Alternative Access for Long Vehicles to Site 3

Arising from the restricted junctions at both ends of O'Rahilly Parade, an alternative part time access to Site 3 from Parnell Street via Moore Lane is also proposed. This access would be for long vehicles only and would operate in the mornings up to 11h00 as illustrated in Figure 13.25.

Long vehicles travelling south on Moore Lane would require the presence of temporary traffic signals and/or flagmen at different locations at different times depending on the movements in progress.

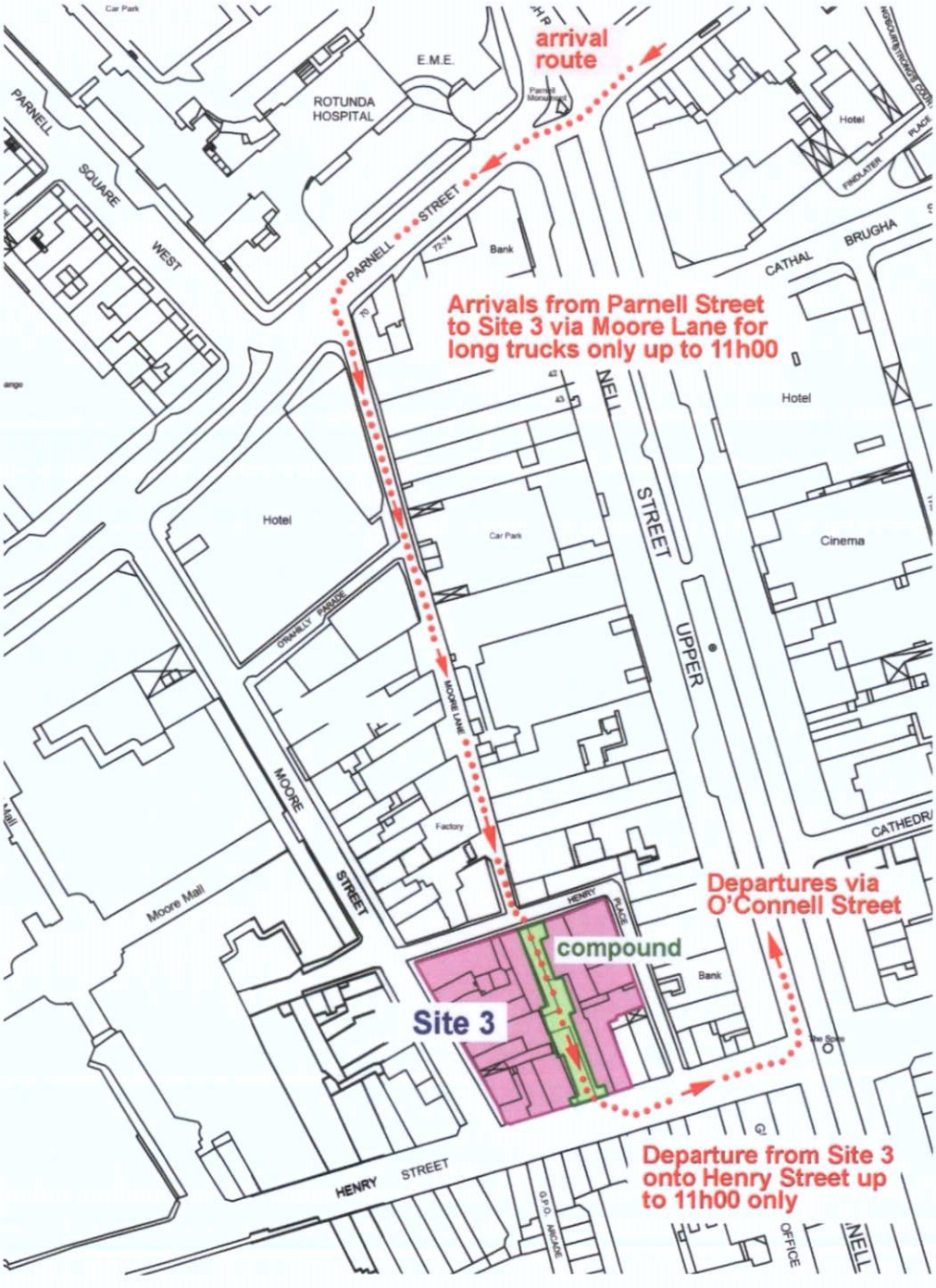

Figure 13.25: Alternative Access for Long Vehicles to Site 3.

13.5.1.1.8 Temporary Street and Junction Upgrade Works

The layout and width of the existing streets and lanes in the area of the subject site is such that the identification of the preferred option has generated a requirement for temporary local upgrades to the network.

The upgrades required, which are shown on Figure 11.26, comprise local junction widening at either end of O'Rahilly Parade and local carriageway widening midway along Moore Lane.

The temporary upgrade works required for the construction traffic movements include: -

(a) Junction Moore Street and O'Rahilly Parade

- Relocation of existing street furniture.
- Realignment of existing kerbs.

(b) Junction O'Rahilly Parade and Moore Lane

- Removal of existing depot boundary wall.
- Realignment of existing kerbs.

(c) Moore Lane

- Removal of existing boundary wall to create passing area.

Details of the widening works are included on the drawings which form part of the planning applications for Dublin Central to Dublin City Council.

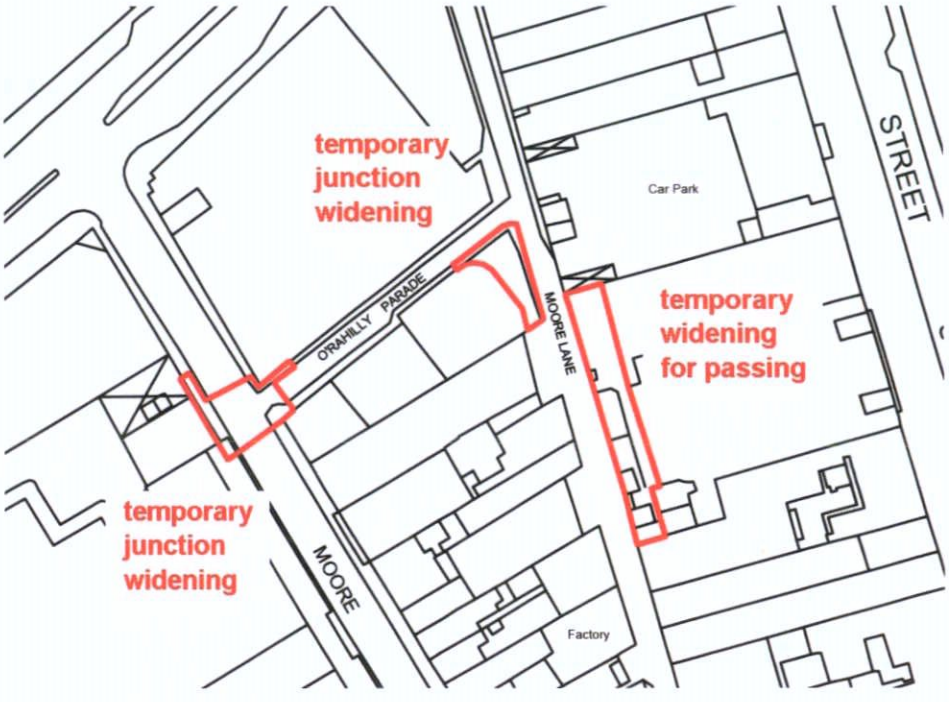

Figure 13.26: Temporary Street and Junction Upgrade Works.

13.5.1.1.9 Parking During Construction

For the purpose of this chapter of the EIAR, it has been assumed that there will be no car parking for construction staff on site.

Construction staff will either travel to site by public transport or park off-site.

13.5.1.1.10 Traffic Modelling

TRANSYT Overview

The traffic modelling described in this EIAR was carried out by Waterman Moylan using the industry standard software package TRANSYT.

TRANSYT is a computer program for studying everything from isolated road junctions to large signal-coordinated networks. It is capable of developing optimum signal settings for representative traffic conditions of a system. Priority intersections (non-signalised junctions) and roundabouts can also be modelled using TRANSYT, however this is only appropriate where these junctions form part of a larger network comprised of signalised junctions.

TRANSYT contains two main components – a traffic model and a signal optimiser. The traffic model predicts a Performance Index (PI) for a network based on a fixed signal timing plan and set of average traffic flows. The PI is a measure of the overall cost associated with congestion and is a weighted combination of total vehicle delay and stops experienced by traffic within the modelled network. The signal optimisation component within TRANSYT modifies signal timings and assesses whether those adjustments have reduced the PI.

The output report of a TRANSYT model also includes a number of other results to evaluate the studied system, such as Degree of Saturation percentage (DOS%) figure, Mean Maximum Queue (MMQ) and Mean Delay per pcu for each link on the road network.

Degree of Saturation (DOS):

DOS, also referred to as Volume to Capacity Ratio (v/c), is a measure of performance which represents the capacity of a junction/traffic lane/link to accommodate the vehicular demand and indicates how near the network is to the maximum capacity available. A DOS less than 85% generally indicates that adequate capacity is available, and vehicles are not expected to experience significant queues and delays. As the DOS approaches 100%, traffic flow may become unstable, and delay and queuing conditions may occur.

Mean Maximum Queue (MMQ):

MMQ is the highest estimated mean number of Passenger Car Units (pcu) queued in any lane of a junction approach link, averaged over the entire analysis period.

Mean Delay per Vehicle (seconds):

Mean Delay per vehicle is the average delay experienced by a vehicle on a junction approach link or traffic stream as a result of having to queue at signals or having to give way at a priority junction.

Description of Modelled Network

Four junctions along the section of Parnell Street between its intersections with O'Connell Street Upper and Dominick Street have been assessed. The junctions modelled were: -

Junction 1: Parnell Street @ O'Connell Street Upper and Parnell Square East

This junction is a signalised crossroads with LUAS line and new northbound cycle phase. Its layout has been recently altered as part of the Parnell Square Contraflow Cycle Scheme to comprise the following configuration: -

- Reduction of O'Connell Street Upper (southern approach) to a single 3.5m wide traffic lane catering for all traffic with no bus priority.
- Inclusion of north-south signal phase on O'Connell Street Upper (southern approach) for cyclists wishing to cross Parnell Street towards Parnell Square East.
- Reduction of Parnell Square East (northern approach) to one lane for right turns onto Parnell Street (western approach).

Junction 2: Parnell Street @ Parnell Square West (Signalised T-junction with LUAS line).

Junction 3: Parnell Street @ Moore Street (Priority-controlled T-junction).

Junction 4: Parnell Street @ Dominick Street (Signalised T-junction with LUAS line).

Between O'Connell Street Upper and Parnell Square West, Parnell Street is a 24-hour clearway with one traffic lane westbound on the south side of the street, one shared traffic lane/LUAS line westbound in the centre of the street and one eastbound LUAS line on the north side of the street.

Between Parnell Square West and Moore Street, Parnell Street is a 24-hour clearway with one traffic lane westbound on the south side of the street, one traffic lane eastbound in the centre of the street separated by a median from two LUAS lines on the north side of the street.

Between Moore Street and Dominick Street, Parnell Street is a 24-hour clearway with two traffic lanes westbound on the south side, one traffic lane eastbound in the centre of the street separated by a median from two LUAS lines on the north side of the street.

Approach

The approach undertaken for carrying out this TRANSYT analysis consisted of: -

1) Inputting local Sydney Coordinated Adaptive Traffic System (SCATS) provided by Dublin City Council (DCC) which include vehicle/tram flows and stage sequences and timings of each signalised junction.

2) Setting up TRANSYT models of each junction to establish the base scenario.

3) Adding Proposed Development's construction traffic to the base scenario to project the Construction Stage scenario.

   a. Comparing both assessed scenarios to identify any potential effects that may arise during the Construction Stage of the Proposed Development.

During the Construction Stage, the appointed Contractor will be required to maintain access along Moore Lane and Henry Place to existing properties at the times currently permitted by Dublin City Council or as may otherwise be agreed with the property owners and DCC.

Assessed Scenarios

The performance of the modelled road network as described above has been analysed for the critical AM Peak Hour 09h45 to 10h45 (based on surveyed results by DCC for Tuesday 4th February 2020) for the following scenarios: -

- **Base Scenario:** Road network with baseline flows (including LUAS line and new northbound cycle phase on Junction 1) and without subject development trips.
- **Construction Stage:** Road network with baseline flows (including LUAS line and new northbound cycle phase on Junction 1) with construction traffic added to the baseline flows. In this scenario, a slight change to the road network configuration has been adopted which consists of Moore Lane (from Parnell Street to O'Rahilly Parade) been reversed to northbound traffic only to facilitate construction traffic departing from the subject site.

Construction of TRANSYT Base Network

Having adopted the approach and the extent of the study area, the TRANSYT models have been developed. Typical input data to construct a TRANSYT model include traffic flows (vehicles or pcu per time segment), traffic signal controller phases and stages, intergreen times, saturation flows and lane lengths. Stage sequences and timings, intergreen times, and traffic flows were provided by DCC for all signalised junctions in the form of SCATS.

Baseline Flows – Peak Hour (SCATS Data from DCC)

Baseline Traffic (Normal, Bus and Tram)

As previously described earlier in this TA, due to ongoing travel restrictions that have been implemented to curb the spread of COVID-19, carrying out traffic count survey was not possible for this TA, and in any case would be unlikely yield useful data. Instead, SCATS pre-COVID traffic counts provided by DCC from a survey in February 2020 has been examined to identify the peak hour amongst all assessed junctions surveyed. The Peak Hour for the junctions located in Figure 13.7 was identified at 09h45 to 10h45.

Pedestrian Movements

Again, due to COVID-19 restrictions, carrying out pedestrian movement survey was also not possible for this TA. Instead, historic pedestrian movement surveys from a number of surveys were examined and used to predict existing data (pre COVID-19 restrictions). The pedestrian movements resultant of this exercise, which were used as input data on TRANSYT model, are illustrated in Figure 13.8 of this report.

Model Set-Up

Streams Controller, Signal Timings, and Intergreen Periods

The modelled road network incorporates the following four junctions: -

- Parnell Street @ O'Connell Street Upper and Parnell Square East (Signalised Crossroads with LUAS line and new northbound cycle phase).
- Parnell Street @ Parnell Square West (Signalised T-junction with LUAS line).
- Parnell Street @ Moore Street (Priority-controlled T-junction).
- Parnell Street @ Dominick Street (Signalised T-junction with LUAS line).

Each signalised junction (Junctions 1, 2 and 4) is controlled by a Controller Streams which contains all the signal control data associated with the junction it is controlling. A controlled stream includes all signal timing data such as cycle, phases, stages and intergreen values; stage library (phases on each stage) and stage sequence.

Stage Libraries and Sequencies

Details of the existing typical stage libraries and sequencies of each signalised junction have been obtained from DCC in the form of SCATS. This data, which include pedestrian, normal traffic tram and new cycle phases have been input in the TRANSYT models for each signalised junction.

Signal Timings

Average cycle times and minimum/average signal timings for each phase/stage have been provided by DCC. These values were input in the TRANSYT models for each signalised junction.

Intergreens

An intergreen period refers to the period of time between the end of the green signal giving right of way for one phase and the beginning of the green signal for the next phase. The normal minimum value of an intergreen period is 5 seconds (3 seconds amber and 2 seconds all red), but this is very often longer for larger junctions. The *'Traffic Management Guidelines'* published by the Stationery Office states the following with regards to intergreen times: -

"The intergreen times can vary between 5 seconds for compact junctions and 10 seconds or more for junctions with a long distance between entries and exits. Particular care is needed when pedestrian phase follows a traffic phase."

Intergreen values for each stage of each signalised junction have been provided by DCC and input to the TRANSYT model.

Saturation Flows

Saturation flow is a common concept in Traffic Engineering and largely used in junction modelling. For a signalised intersection, a Base (or unadjusted) Saturation Flow can be defined as the maximum amount of flow crossing a stop line if the signals were permanently on green, and is given by the following relationship:

$$S = 3600 / h$$

Where: S = Saturation Flow (pcu/hour or Vehicle/hour); h = Saturation headway (sec/pcu or sec/veh); 3600 = number of seconds in one hour.

When developing a model with TRANSYT, the software initially adopts all signalised lanes of the network as having a Base Saturation Flow of 1,800 pcu/hour based on a saturation headway value of 2 seconds per pcu (or vehicle). This value represents a base or unadjusted saturation flow.

In TRANSYT, there is also the option to calculate the saturation flow of each lane using the equations of the UK's RR67 (Research Report 67 – The Prediction of Saturation Flows for Road Junctions Controlled by Traffic Signals). By selecting this option, extra data for each lane needs to be specified such as Site Quality Factor, Road Surface Condition, Gradient, Width, Proportion that turn, Turning Radius and Nearside Lane. These additional data included, provide for a more accurate saturation flow value for each lane, sometimes higher and sometimes lower than the default value of 1,800 pcu/hour per lane as described above. In that case, saturation flows for each lane on the modelled network have been calculated using RR67.

All details of the model set up, including Saturation Flows, are provided within the TRANSYT output reports.

13.5.1.1.11 Construction Traffic (pcu)

Traffic is composed of various types of vehicles. TRANSYT software normally utilises a common unit - known as the Passenger Car Unit (pcu), to represent general mixed-traffic on a road network. The conversion factor assigned to Heavy Goods Vehicles (HGV), so that an equivalent pcu value is generated, is 2.3. This is in line with TII 'Project Appraisal Guidelines for National Roads Uni 5.2 – Data Collection' which references the typical pcu values suggested by Transport for London (TfL).

As earlier in tis TA, the construction-related truck movements during the AM peak hour are estimated at 12 arrivals and 12 departures. Based on that, the equivalent pcu value input in TRANSYT to represent the construction traffic was 28 pcu arrivals and 28 pcu departures.

13.5.1.1.12 Construction Trip Distribution

Two construction routes to the site have been identified both to Parnell Street and both complying with the DCC requirements for HGV movements. One would be via Summerhill and Parnell Street and the second preferred route via Dorset Street and Dominick Street Lower. See Figure 13.27.

For this assessment, it has been assumed that 50% of the construction traffic will arrive from Summerhill and 50% from Dorset Street/Dominick Street Lower. The corresponding pcu flows based on the assumed distribution is 13 pcu per route. This assumption can be revised in future analysis if necessary.

With regards to departure route, it was assumed that 100% of construction traffic will leave the site via Moore Lane (reversed during constructing stage from the current layout to accommodate these construction movements), turn left onto Parnell Street and then right onto Bolton Street/Dorset Street. This also complies with the DCC requirements for HGV movements.

Figure 13.27: Construction Traffic Trip Distribution.

13.5.1.1.13 Modelling Results

Base Scenario

A summary of the TRANSYT modelling results for each assessed junction for the Base Scenario is provided below. The assessed junctions were labelled as follows:

- **Junction 1:** Parnell Street @ O'Connell Street Upper and Parnell Square East (signalised Crossroads with LUAS line and new northbound cycle phase). It is worth remembering that the following alterations to Junction 1 has been recently undertaken as part of the Parnell Square East Contraflow Cycle Scheme: -
    - Reduction of O'Connell Street Upper (southern approach) to a single 3.5m wide traffic lane catering for all traffic with no bus priority.
    - Inclusion of north-south signal phase on O'Connell Street Upper (southern approach) for cyclists wishing to cross Parnell Street towards Parnell Square East.
    - Reduction of Parnell Square East (northern approach) to one lane for right turns onto Parnell Street (western approach).
- **Junction 2:** Parnell Street @ Parnell Square West (Signalised T-junction with LUAS line)
- **Junction 3:** Parnell Street @ Moore Street (Priority-controlled T-junction)
- **Junction 4:** Parnell Street @ Dominick Street (Signalised T-junction with LUAS line)

The TRANSYT analysis results as summarised in Table 13.13 below indicate that all modelled junctions are currently operating within capacity during the critical AM peak hour (09h45 – 10h45) with the highest DOS at 85% and a corresponding queue of 10.22 pcu occurring on Parnell Street (E), Junction 1.

Junction (Control Type)	Approach	Number of Lanes or Lane Type	Movement	DOS% or RFC	Mean Max Queue (pcu)	Mean Delay per Vehicle (s)
Junction 1 (Signalised Crossroads)	O'Connell Street Upper (S)	1	L	73	11.31	39.13
		LUAS	L/R	3	0.34	31.55
	Parnell Street (W)	LUAS	S	2	0.18	40.27
	Parnell Square East (N)	1	R	34	3.58	40.58
		1	S	23	6.15	12.00
		1	S/L	10	1.57	13.60
	Parnell Street (E)	1	S	85	10.22	137.51
		1	S	75	4.75	135.94
Junction 2 (Signalised T-junction)	Parnell Street (E)	1 shared w/ LUAS	S/R	68	7.09	42.88
		1	S/L	28	4.96	5.69
		1	S	27	1.56	1.66
	Parnell Street (W)	LUAS	S	8	0.29	84.48
		1	L	61	4.38	44.27
Junction 3 (Priority T-junction)	Parnell Street (W)	1	S/R	19	0.24	3.30
	Moore Street (S)	1	L/R	15	0.18	4.78
Junction 4 (Signalised T-junction)	Parnell Street (E)	2	S	22	3.96	5.59
		LUAS	R	8	0.31	54.09
	Parnell Street (W)	1	S	18	1.59	5.59
	Dominick Street Upper (N)	1	L	27	0.83	27.65
		LUAS	L	5	0.19	53.52

Table 13.13: Results for TRANSYT Base Scenario.

Construction Stage

A summary of the TRANSYT modelling results for each assessed junction for the Construction Stage scenario is provided below. It is worth remembering that for this scenario Moore Lane (from Parnell Street to O'Rahilly Parade) was reversed form the current southbound flow to northbound traffic only to accommodate construction traffic departing from the subject site.

The TRANSYT analysis results as summarised in Table 13.14 below indicate that all modelled junctions would continue to operate within capacity for the Construction Stage scenario during the critical AM peak hour (09h45 – 10h45), with the highest DOS of 91% and a corresponding queue of 12.20 pcu at Junction 1 (O'Connell Street Upper / Parnell Street).

Summary

The results of the assessment as summarised in Table 13.14 indicate that the modelled network would continue to operate within capacity for the Construction Stage scenario during the AM Peak Hour.

No significant change in performance of any junctions were recorded due to the inclusion of the construction traffic of the Proposed Development. Details of the predicted impact of the Proposed Development during the construction stages summarised in Table 13.14 below.

Junction (Control Type)	Approach	Number of Lanes or Lane Type	Movement	DOS% or RFC	Mean Max Queue (pcu)	Mean Delay per Vehicle (s)
Junction 1 (Signalised Crossroads)	O'Connell Street Upper (S)	1	L	73	11.31	39.14
		LUAS	L/R	3	0.34	31.55
	Parnell Street (W)	LUAS	S	2	0.18	40.27
	Parnell Square East (N)	1	R	34	3.58	40.58
		1	S	23	6.15	12.00
		1	S/L	10	1.57	14.60
	Parnell Street (E)	1	S	91	12.20	163.57
		1	S/L	82	5.53	164.08
Junction 2 (Signalised T-junction)	Parnell Street (E)	1 shared w/ LUAS	S/R	68	7.09	42.88
		1	S	29	5.14	5.77
		1	S	30	4.41	1.95
	Parnell Street (W)	LUAS	S	8	0.29	84.48
		1	L	61	4.38	44.27
	Moore Lane (S)	1	L	3	0.00	0.05
Junction 3 (Priority T-junction)	Parnell Street (W)	1	S/R	21	0.26	3.48
	Moore Street (S)	1	L/R	16	0.18	4.84
Junction 4 (Signalised T-junction)	Parnell Street (E)	2	S	23	4.18	5.66
		LUAS	R	8	0.31	54.09
	Parnell Street (W)	1	S	18	1.59	5.59
	Dominick Street Upper (N)	1	L	34	1.10	29.25
		LUAS	L	5	0.19	53.52

Table 13.14: Results for TRANSYT Construction Stage Scenario.

13.5.1.1.14 Traffic Impact

Methodology

Two separate methods were used to assess the impact of construction traffic on the operation of the road network. Firstly, the trips generated by the development were compared with the surveyed approach flows at a number of the junctions on the construction haul routes to determine if the construction trips would exceed 5% of the traffic on the adjoining roads. Secondly, the operation of the street network was modelled using industry standard software.

Traffic Threshold

The approach flow for each of the nine junctions surveyed on the construction haul routes for the Dublin Central development are presented in Table 13.15. The approach flows, which are for the weekday period 07h00 – 19h00, were extracted from the traffic survey carried out by TII In May 2018. The flows in the table include motorcycle, car, bus, coach, LGV, OGV1 and OGV2. They do not include cyclists or pedestrians.

The construction traffic trips in Table 13.14 were taken from Section 13.5.1.1.4 of this EIAR.

Three alternative scenarios for trip distribution during the Construction Stage were reviewed during the preparation of Table 13.15. These are described below: -

a) All of the construction traffic could use the haul route to the site via Summerhill and Parnell Street.

b) All of the construction traffic could use the haul route to the site via Dorset Street and Dominick Street Lower.

c) The construction traffic would be divided between the two routes.

Following a review, Table 13.15 was formulated on the basis that a combination of (a) and (b) would represent the worst-case scenario.

From Table 13.15, it will be seen that the traffic generated by the construction stage of the Proposed Development at Dublin Central is significantly below the threshold of 5% of the flow on the adjoining road as set by Section 4.1.3 of Appendix 4 of the Dublin City Development Plan 2016 – 2022.

The location at which the highest increase of 1.48% is predicted to occur is Junction 83 at the intersection of Sherriff Street and Seville Place. This location is well outside the City Centre.

The equivalent increase at Junction 9 O'Connell Street Upper / Parnell Street, the nearest junction to the Proposed Development, would be 1.33%.

Notwithstanding the failure to trigger the 5% threshold and on foot of discussions with DCC and TII, an assessment was carried out on the operation of Parnell Street between O'Connell Street Upper and Dominick Street during the Construction Stage using the computer program TRANSYT.

Junction	Location	Approach Flow 07h00-19h00 vehicles	Construction Traffic 07h00-19h00 vehicles	Ratio
9	O'Connell Street Upper Parnell Street Cavendish Row	13,193	190	1.33%
22	Dorset Street N Circular Road	36,764	190	0.52%
24	Summerhill Gardiner Street Parnell Street	20,402	190	0.93%
25	Bolton Street Capel Street	20,393	95	0.47%
62	Dorset Frederick Street Blessington St	22,978	190	0.82%
66	Summerhill Portland Row N Circular Road	24,818	190	0.77%
83	Seville Place Sherriff Street	12,805	190	1.48%
88	East Wall Road Sherriff Street	26,726	190	0.71%
92	Dorset Street Dominick Street	19,076	190	1.00%

Table 13.15: Junction Approach Flow – Construction Stage.

Traffic Modelling

For the Construction Stage, an assessment was carried out on the operation of Parnell Street between O'Connell Street Upper U and Dominick Street using TRANSYT. The section of Parnell Street modelled included the LUAS Green Line and the Parnell Square Contraflow Cycle Facility under construction at the time of writing in March 2021.

The predicted impact of the Proposed Development on the operation of Parnell Street is summarised in Table 13.16.

From Table 13.16, it will be seen that the highest changes in performance during the Construction Stage occur on Parnell Street (E) – Junction 1 and on Dominick Street Upper (N) – Junction 4. These roads are the two designated access routes for construction traffic to the subject site.

In summary, the results of the traffic modelling confirmed the results of the Traffic Threshold analysis that the construction traffic generated at Dublin Central would not significantly the operation of the surrounding road network.

Junction (Control Type)	Approach	Number of Lanes or Lane Type	Movement	DOS% or RFC	Mean Max Queue (PCU)	Mean Delay per Vehicle (s)
Junction 1 (Signalised Crossroads)	O'Connell Street Upper (S)	1	L	0	0	0
		LUAS	L/R	0	0	0
	Parnell Street (W)	LUAS	S	0	0	0
	Parnell Square East (N)	1	R	0	0	0
		1	S	0	0	0
		1	S/L	0	0	0
	Parnell Street (E)	1	S	6	1.98	26.06
		1	S/L	7	0.78	28.13
Junction 2 (Signalised T-junction)	Parnell Street (E)	1 shared w/ LUAS	S/R	0	0	0
		1	S	1	0.18	0.08
		1	S	3	2.85	0.29
	Parnell Street (W)	LUAS	S	0	0	0
		1	L	0	0	0
	Moore Lane (S)	1	L	3	0	0.05
Junction 3 (Priority T-junction)	Parnell Street (W)	1	S/R	2	0.02	0.18
	Moore Street (S)	1	L/R	1	0	0.06
Junction 4 (Signalised T-junction)	Parnell Street (E)	2	S	1	0.22	0.07
		LUAS	R	0	0	0
	Parnell Street (W)	1	S	0	0	0
	Dominick Street Upper (N)	1	L	7	0.27	1.6
		LUAS	L	0	0	0

Table 13.16: Predicted Impact During the Construction Stage.

13.5.1.1.15 Consultations

An essential element of the planning stage for Dublin Central was a series of consultations with the Transportation Department, Dublin City Council (DCC) and with Transport Infrastructure Ireland (Luas and Metro).

The meetings which were held between September 2020 and February 2021 discussed a number of issues relating to the Construction Stage including: -

- Program and phasing.
- Quantum and timing of construction traffic.

- Excavation and dewatering for the Metro Box.
- Interaction of construction vehicles with Luas on Parnell Street.
- Haul routes.
- Parking for construction workers during construction.
- Construction access from O'Connell Street Upper.

Arising from the meetings, construction traffic was identified as the main traffic related issue to be addressed for the Construction Stage.

13.5.1.1.16 Potential Impacts

The potential impacts during the Construction Stage arising from the proposed redevelopment of Dublin Central are set out below: -

- Non-compliance with the Construction Traffic Management Plan and / or the Construction Management & Waste Management Plan including adherence to the HGV routes designated by Dublin City Council for the City Centre. could lead to traffic delays / congestion and endanger vehicle, cycle, and pedestrian safety.
- The volume of construction traffic on Parnell Street could lead to vehicular delays.
- Reducing the width of the road carriageway on Parnell Street to facilitate hoarding, scaffolding or other construction works could lead to vehicular delays.
- Reducing the width of the road carriageway on Henry Street to facilitate hoarding, scaffolding or other construction works could lead to vehicular delays before 11h00 and pedestrian delays after 11h00.
- Reducing the width of the footpath on Moore Street to facilitate hoarding, scaffolding and other construction works could restrict street trading and cause pedestrian delays after 11h00.
- Reducing the width of the carriageway on O'Rahilly Parade, Moore Lane, and Henry Place to facilitate hoarding, scaffolding and other construction works could lead to vehicular delays for existing users.
- Temporary closure of O'Rahilly Parade, Moore Lane and Henry Place to pedestrians could lead to additional walking time for pedestrians.
- The use of improperly designed access and egress points to the site for the development could endanger vehicle, cycle, and pedestrian safety.
- HGVs waiting on public roads outside the site could lead to traffic delays and congestion.
- No check(s) on each departing vehicle at the exit from site onto the public road could lead to the deposition of demolition material, mud and/or debris onto the public roads.
- Non-compliance with DCC regulations for HGVs could endanger vehicle, cycle, and pedestrian safety.
- The installation of underground services including drainage and watermains particularly on O'Rahilly Parade, Moore Lane and Henry Place could lead to vehicular delays, congestion, or diversion.

The impacts of each or all of (a) –(l) listed above are likely to be slight negative and short term.

13.5.1.2 Operational Stage

13.5.1.2.1 Methodology

The impact of the Operational Stage was assessed by comparing the trips generated by the completed development with the traffic on the adjoining roads.

13.5.1.2.2 Trip Generation

Arising from the minimal provision of car parking and the high public transport provision, vehicle trip generation from Dublin Central will be extremely low. As a result, the modal split for the private car will be significantly less than for other developments in the Dublin area.

At Dublin Central, trips will be generated the 26 car parking spaces at basement level and the service / delivery vehicles supporting the development. These trips are presented in Table 13.17.

From Table 13.17, it will be seen that the traffic predicted to be generated during the Operational Stage comprises a total of 72 movements during the critical AM peak hour (44 arrivals and 28 departures) and 38 movements during the PM peak hour (10 arrivals and 28 departures).

Time	AM Peak Hour 08h00 -09h00		PM Peak Hour 17h00 -18h00	
Mode	Arrivals	Departures	Arrivals	Departures
Cars	20	4	4	20
Deliveries	17	17	2	2
Local /Other	8	8	4	4
Total	45	29	10	28

Table 13.17 : Summary of Generated Trips for AM and PM Peak Hours – Dublin Central Masterplan Site.

13.5.1.2.3 Trip Distribution

In this EIAR, it has been assumed that 100% of the cars arriving to the 26 car parking spaces at basement level will arrive from Parnell Street via Moore Street, O'Rahilly Parade and Moore Lane. Departure would be via Moore Lane to Parnell Street.

It has also been assumed that 50% of the service vehicles will arrive from O'Connell Street Upper via Henry Street into Henry Place. The remaining 50% would arrive from Parnell Street via Moore Street into O'Rahilly Parade. Departures would be 50% to Henry Street and 50% to Parnell Street from Moore Lane.

The trips generated by the development during the AM Peak Hour 08h00-09h00 are presented in Figure 13.28.

Figure 13.28: Development Trips AM Peak Hour 08h00 – 09h00.

13.5.1.2.4 Traffic Impact

By comparing the generated traffic (Figure 13.28) with the existing traffic surveyed by DCC In February 2020 (Figure 13.7), it will be seen that the trips generated by the development (Figure 13.29) are less than 5% of the traffic on the surrounding streets.

Since the vehicle trips expected to be generated by the Proposed Development during the Operational Stage will not exceed the 5% threshold for junction modelling as set out under the Traffic and Transport Assessment Guidelines (TII/NRA, May 2014). It can therefore be concluded that a Traffic Assessment is not required for the Operational Stage and that there will be minimal traffic impact on the surrounding road network post construction.

13.5.1.2.5 Consultations

An essential element of the planning stage for Dublin Central was a series of consultations with the Transportation Department, Dublin City Council (DCC) and with Transport Infrastructure Ireland (Luas and Metro).

The meetings which were held between September 2020 and February 2021 discussed a number of issues including: -

- Development mix and quantum
- Basement parking and access (car lifts).
- Cycle parking.
- Servicing.
- Moore Street traders.
- The timeline for making the planning application.

Arising from the meetings, servicing was identified as the main traffic related issue to be addressed for the Operational Stage.

13.5.1.2.6 Potential Impacts

The potential impacts during the Operational Stage arising from the proposed redevelopment of Dublin Central are set out below.

- The development of the O'Connell Street Upper station on the proposed Metrolink line under Dublin Central will lead to a significant increase in public transport capacity for the surrounding area.
- Removal the existing car parking on Moore Lane could lead to an increased demand for car parking in the surrounding area.
- The existing passenger demand and the future combined provision of Bus Connects, Metrolink, Strategic Green Route, GDA Cycle Network, Strategic Pedestrian Route etc. in the surrounding area when taken together could cause the combined operation of these facilities to exceed the environmental and transportation capacity of the surrounding area. Unless the intensification of future public transport services is limited to its environmental and transportation capacity, any impact is likely to be cumulative negative long term.

The proposed mitigation measures and the predicted impact of these potential impacts are addressed below.

13.5.1.3 Cumulative Development

13.5.1.3.1 Construction Stage

The Potential Impact of the Cumulative Development arising from the Construction Stage is the same as the Potential Impact of the Proposed Development described in Section 13.5.1.1

13.5.1.3.2 Operational Stage

The Potential Impact of the Cumulative Development arising from the Operational Stage is the same as the Potential Impact of the Proposed Development described in Section 13.5.1.2.

13.5.1.3.3 Do Nothing Impact

In the event that the Dublin Central development and the Metrolink Station do not proceed, the transportation environment in the surrounding area will remain as existing.

In this scenario, there will be no Metrolink Station in O'Connell Street Upper nor will there be a public plaza between O'Connell Street Upper and Moore Street.

The existing lanes at O'Rahilly Parade, Moore Lane and Henry Place will remain in their current dilapidated state with inadequate carriageways and no footpaths.

Finally, public transport services including Dublin Bus and the Luas Green Line should continue to operate as at present.

Overall, the do-nothing impact will be to retain the existing poor environment for cyclists and pedestrians between O'Connell Street Upper and Moore Street.

13.5.2 Proposed Development – Site 3, 4 & 5

13.5.2.1 Construction Stage

The Potential Impacts of the Proposed Development (Sites 3, 4 and 5) are the same as the Potential Impacts of the Proposed Development (Dublin Central Masterplan Site) described in Section 13.5.1.1.1.

13.5.2.2 Operational Stage

13.5.2.2.1 Trip Generation

Arising from the minimal provision of car parking and the high public transport provision, vehicle trip generation from Sites 3, 4 and 5 will be extremely low. As a result, the modal split for the private car will be significantly less than for other developments in the Dublin area. Within Sites 3, 4 and 5, trips will be generated only by the service / delivery vehicles supporting the development. These trips are presented in Table 13.18.

Time	AM Peak Hour 08h00 -09h00		PM Peak Hour 17h00 -18h00	
Mode	Arrivals	Departures	Arrivals	Departures
Cars	-	-	-	-
Deliveries	8	8	1	1
Local /Other	8	8	4	4
Total	16	16	5	5

Table 13.18: Summary of Generated Trips for Am and PM Peak Houses – Sites 3, 4 and 5

13.5.2.2.2 Trip Distribution

For the purpose of this EIAR, it has been assumed that 50% of the service vehicles will arrive from O'Connell Street Upper via Henry Street into Henry Place before 11h00. The remaining 50% would arrive from Parnell Street via Moore Street into O'Rahilly Parade. Departures would be 50% to Henry Street before 11h00 and 50% to Parnell Street from Moore Lane.

The trips generated by the development during the AM Peak Hour 08h00-09h00 are presented in Figure 13.29.

Figure 13.29: Development Trips AM Peak Hour 08h00 – 09h00.

13.5.2.3 Cumulative Development

13.5.2.3.1 Construction Stage

The Potential Impact of the Cumulative Development arising from the Construction Stage of the Proposed Development (Sites 3, 4 and 5) will be the same as the Potential Impact of the Proposed Development (Dublin Central Masterplan Site) described in Section 13.5.1.3.1.

13.5.2.3.2 Operational Stage

The Potential Impact of the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Potential Impact of the Dublin Central Masterplan described in Section 13.5.1.3.2.

13.5.2.4 Do Nothing Impact

The Do-Nothing Impact of the Cumulative Development arising from the non-development of the Proposed Development (Sites 3, 4 and 5) will be the same as the Do-Nothing Impact of the Dublin Central Masterplan described in Section 13.5.1.3.3.

13.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

13.6.1.1 Dublin Central Masterplan

13.6.1.1.1 Construction Stage

The primary mitigation measure during the Construction Stage will be the implementation of the *Construction Traffic Management Plan* and the *Construction Management & Waste Management Plan.*

This will require all deliveries to and collection from the subject site to comply with the DCC requirements for HGV movements including the use of the Designated HGV Routes illustrated in Figure 13.2.

Two construction routes to the site have been identified both to Parnell Street. One will be from Dorset Street via Dominick Street and one from Summerhill via Parnell Street.

Proposal for local traffic management during the various stages of construction have also been prepared and will be incorporated in the detailed *Construction Traffic Management Plan* to be prepared by the appointed Contractor in conjunction with Dublin City Council for approval.

Traffic and other movements on the road network during the Construction Stage will be managed by carrying out the works in a number of stages to a sequence to be prepared in conjunction with Dublin City Council and implemented by the main Contractor.

During the Construction Stage, the appointed Contractor will be required to maintain access along Moore Lane and Henry Place to existing properties at the times currently permitted by Dublin City Council or as may otherwise be agreed with the property owners and DCC.

13.6.1.1.2 Operational Stage

The primary mitigation measure during the Operational Stage will be the implementation of the Travel Plan for Dublin Central and in particular the Action Plan section of the Travel Plan which will implement the management of travel demand.

Mitigation measures to limit the impact of the future intensification of public transport services through Bus Connects and Metrolink, are outside the control of the Dublin Central project.

13.6.1.2 Cumulative Development

13.6.1.2.1 Construction Stage

The Mitigation Measures for the Cumulative Development arising from the Construction Stage will be the same as the Mitigation Measures for the Proposed Development described in Section 13.6.1.1.1.

13.6.1.2.2 Operational Stage

The Mitigation Measures for the Cumulative Development arising from the Operational Stage will be the same as the Mitigation Measures for the Proposed Development described in Section 13.6.1.1.2.

13.6.2 Proposed Development – Site 3, 4 & 5

13.6.2.1 Construction Stage

The Mitigation Measures for the Proposed Development arising from the Construction Stage of the Proposed Development will be the same as the Mitigation Measures for the Dublin Central Masterplan described in Section 13.6.1.1.1.

13.6.2.2 Operational Stage

The Mitigation Measures for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Mitigation Measures for the Dublin Central Masterplan described in Section 13.6.1.1.2.

13.6.2.3 Cumulative Development

13.6.2.3.1 Construction Stage

The Mitigation Measures for the Cumulative Development arising from the Construction Stage of the Proposed Development will be the same as the Mitigation Measures for the Dublin Central Masterplan described in Section 13.6.1.2.1.

13.6.2.3.2 Operational Stage

The Mitigation Measures for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Mitigation Measures for the Dublin Central Masterplan described in Section 13.6.1.2.2.

13.7 RESIDUAL IMPACT

13.7.1 Dublin Central Masterplan

13.7.1.1 Construction Stage

13.7.1.1.1 Car Parking

During the Construction Stage, there will be a permanent loss of 160no. car parking spaces on the subject site currently accessed from O'Rahilly Parade and Moore Lane. The reduction in car parking is predicted to be a **permanent long-term slight** impact which will be ameliorated by the high provision of public transport in the surrounding area.

13.7.1.1.2 Traffic Flow / Speed

The presence of construction traffic on the surrounding streets during the Construction Stage is not expected to lead to significant delays to vehicular traffic including public transport. Construction traffic is predicted to generate a temporary **slight negative, short term** impact during the construction site.

13.7.1.1.3 Diversion of Traffic

No traffic diversions are proposed on Parnell Street or O'Connell Street Upper. Local traffic diversions could occur on O'Rahilly Parade, Moore Lane and Henry Place which could lead to a temporary **slight negative, short term** impact during the Construction Stage.

13.7.1.1.4 Delays to Public Transport

No delays or disruption to bus or Luas services are predicted. Some delays may occur to bus or Luas services on Parnell Street and O'Connell Street Upper northbound due to construction traffic for Dublin Central using Parnell Street to access the development site. This impact is expected to be **temporary, short-term, slight,** and **negative.**

13.7.1.1.5 Capacity of Public Transport

Due to the proposed non-provision of car parking on-site, there is likely to be an increased demand for public transport from construction workers. The impact of the additional passenger demand is expected to be **temporary, short-term, slight,** and **negative.**

13.7.1.1.6 Cycle and Pedestrian

During construction works for the installation of underground services on the public streets, temporary facilities will be required to be provided by the main contractor to maintain cycle connectivity and pedestrian access. These facilities will be provided in accordance with the Construction Management & Waste Management Plan and the Construction Traffic Management Plan. The impact is predicted to be **temporary, short-term, slight,** and **negative**.

13.7.1.1.7 Overall

Overall, the impact of the Construction Stage on the transportation environment in the area of the subject site is predicted to be **temporary, short-term, slight**, and **negative**.

13.7.1.2 Operational Stage

13.7.1.2.1 Car Parking

The loss of 160 car parking spaces on Moore Lane will result in the permanent loss of car parking revenue to the operators together with an increased demand on other car parking in the surrounding area, primarily off-street. The loss of car parking is likely to be a **permanent, long-term, slight**, and **negative impact** which will be ameliorated by the high provision of public transport in the surrounding area.

13.7.1.2.2 Traffic Flow / Speed

No works are proposed to the carriageways or junctions on O'Connell Street Upper, Parnell Street or Moore Street. The results of the traffic modelling undertaken demonstrates that the surrounding street network will operate without any material or significant impact on the road infrastructure. As a result, the Proposed Development is predicted to have a **permanent, neutral, long term slight** and **impact** on traffic flows and speeds on O'Connell Street Upper and Parnell Street.

13.7.1.2.3 Diversion of Traffic

No traffic diversions are proposed on Parnell Street or O'Connell Street Upper. Permanent reversal of traffic flow from one-way southbound to one-way northbound is proposed on the northern section of Moore Lane. Pedestrianisation is proposed on Henry Place and on the southern section of Moore Lane. These changes are predicted to have a **permanent, long term, moderate** and **positive impact** on the transportation network.

13.7.1.2.4 Delays to Public Transport

No delays or disruption to bus or Luas services are predicted. The impact of the development is predicted to be **permanent, long term, imperceptible** and **neutral.**

13.7.1.2.5 Capacity of Public Transport

The commissioning of Metrolink and the high level of public transport usage by staff, guests, and residents at Dublin Central are predicted to **create a permanent, long term, significant** and **positive impact** on public transport in the City Centre.

13.7.1.2.6 Cycle and Pedestrian

The proposed pedestrian area on Moore Lane and Henry Place in conjunction with the extensive provision of cycle parking are predicted to create **a permanent, long term, significant** and **positive impact** on the pedestrian and cycle environment in the City Centre.

13.7.1.2.7 Overall

Overall, the impact of the Operational Stage on the transportation environment in the area of the subject site is predicted to be permanent, long-term, slight, and positive.

13.7.1.3 Cumulative Development

13.7.1.3.1 Construction Stage

The Residual Impact for the Cumulative Development arising from the Construction Stage will be the same as the Residual Impact for the Proposed Development described in Section 13.7.1.1.

13.7.1.3.2 Operational Stage

The Residual Impact for the Cumulative Development arising from the Operational Stage will be the same as the Residual Impact for the Proposed Development described in Section 13.7.1.2.

13.7.1.4 Worst Case Impact

Where the various mitigation measures (ameliorative, remedial, reductive, and monitoring) described in Section 13.6 are not implemented correctly or fail, the proposal is likely to have to be a **negative short-term moderate impact** on the transportation environment during the Construction Stage and **a negative long term slight impact** on the transportation environment during the Operational Stage.

13.7.2 Proposed Development – Site 3, 4 & 5

13.7.2.1 Construction Stage

The Residual Impact for the Proposed Development arising from the Construction Stage of the Proposed Development will be the same as the Residual Impact for the Dublin Central Masterplan Site described in Section 13.7.1.1.

13.7.2.2 Operational Stage

The Residual Impact for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Residual Impact for the Dublin Central Masterplan Site described in Section 13.7.1.2.

13.7.2.3 Cumulative Development

13.7.2.3.1 Construction Stage

The Residual Impact for the Cumulative Development arising from the Construction Stage of the Proposed Development will be the same as the Residual Impact for the Dublin Central Masterplan Site described in Section 13.7.1.3.1.

13.7.2.3.2 Operational Stage

The Residual Impact for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Residual Impact for the Dublin Central Masterplan Site described in Section 13.7.1.3.1.

13.7.2.4 Worst Case Impact

The Worst-Case Impact for the Proposed Development will be the same as the Worst-Case Impact for the Dublin Central Masterplan described in Section 13.7.1.4

13.8 MONITORING

13.8.1 Dublin Central Masterplan

13.8.1.1 Construction Stage

The project team for Dublin Central will be tasked to monitor the operation of both the *Construction and Waste Management Plan* and the *Construction Traffic Management Plan.* In particular, any local congestion and / or delays to public transport services on O'Connell Street Upper or Parnell Street should be monitored and the cause(s) of addressed.

Any issues identified, congestion or delays arising should be addressed arising in conjunction with DCC Roads and Traffic.

13.8.1.2 Operational Stage

The management team at Dublin Central will be tasked to monitor the operation of the Travel Plan including public transport demand from Dublin Central. Any issues arising should be advised to DCC and the public transport operators.

The management team should also monitor the operation of Parnell Street and advise DCC Roads and Traffic in relation to any operational or safety issues noted.

13.8.1.3 Cumulative Development

13.8.1.3.1 Construction Stage

The Monitoring for the Cumulative Development arising from the Construction Stage will be the same as the Monitoring for the Proposed Development described in Section 13.8.1.1.

13.8.1.3.2 Operational Stage

The Monitoring for the Cumulative Development arising from the Operational Stage will be the same as the Monitoring for the Proposed Development described in Section 13.8.1.2.

13.8.2 Proposed Development – Site 3, 4 & 5

13.8.2.1 Construction Stage

The Monitoring for the Proposed Development arising from the Construction Stage of the Proposed Development will be the same as the Monitoring for the Dublin Central Masterplan described in Section 13.8.1.1.

13.8.2.2 Operational Stage

The Monitoring for the Proposed Development arising from the Operational Stage of the Proposed Development will be the same as the Monitoring for the Dublin Central Masterplan described in Section 13.8.1.2.

13.8.2.3 Cumulative Development

13.8.2.3.1 Construction Stage

The Monitoring for the Cumulative Development arising from the Construction Stage of the Proposed Development will be the same as the Monitoring for the Dublin Central Masterplan described in Section 13.8.1.3.1.

13.8.2.3.2 Operational Stage

The Monitoring for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Monitoring for the Cumulative Development of the Dublin Central Masterplan described in Section 13.8.1.3.2.

13.9 REINSTATEMENT

13.9.1 Dublin Central Masterplan

13.9.1.1 Construction Stage

Following completion of the Construction Stage, the public streets affected by the development including Parnell Street, O'Rahilly Parade, Henry Place will be reinstated by the appointed Contractor in compliance with the current Code of Practice issued by Dublin City Council and any conditions that may be included in the grant of planning permission for the development.

13.9.1.2 Operational Stage

No reinstatement is proposed during the Operational Stage other than the ongoing maintenance of roads, footpaths, buildings, and services.

13.9.1.3 Cumulative Development

13.9.1.3.1 Construction Stage

The Reinstatement for the Cumulative Development arising from the Construction Stage will be the same as the Reinstatement for the Proposed Development described in Section 13.9.1.1.

13.9.1.3.2 Operational Stage

The Reinstatement for the Cumulative Development arising from the Operational Stage will be the same as the Reinstatement for the Proposed Development described in Section 13.9.1.2.

13.9.2 Proposed Development – Site 3, 4 & 5

13.9.2.1 Construction Stage

The Reinstatement for the Proposed Development arising from the Construction Stage of the Proposed Development will be the same as the Reinstatement for the Dublin Central Masterplan described in Section 13.9.1.3.1.

13.9.2.2 Operational Stage

The Reinstatement for the Proposed Development arising from the Operational Stage of the Proposed Development will be the same as the Reinstatement for the Dublin Central Masterplan described in Section 13.9.1.3.2.

13.9.2.3 Cumulative Development

13.9.2.3.1 Construction Stage

The Reinstatement for the Cumulative Development arising from the Construction Stage of the Proposed Development will be the same as the Reinstatement for the Cumulative Development of the Dublin Central Masterplan described in Section 13.9.1.3.1.

13.9.2.3.2 Operational Stage

The Reinstatement for the Cumulative Development arising from the Operational Stage of the Proposed Development will be the same as the Reinstatement for the Cumulative Development of the Dublin Central Masterplan described in Section 13.9.1.3.2.

13.10 DIFFICULTIES ENCOUNTERED

The difficulties encountered during the preparation of this chapter of the EIAR were primarily related to the impact of the nationwide restrictions imposed to limit the spread of Covid-19.

The on-site activities negatively affected by the restrictions after March 2020 included: -

- Surveys of existing streets and traffic management.
- Observations on the operation of the existing transportation network.
- Observations on traffic speeds, potential safety issues and delays.
- Observations on the operation of the existing public transport in the area of the site.
- Traffic, pedestrian, and cycle surveys.
- Survey of local deliveries.

- Consultations with DCC and TII.

As a result of these restrictions, the preparation of Chapter 13.0 included historic surveys and virtual viewing of the site and surrounding streets.

14 MATERIAL ASSETS (WASTE)

14.1 INTRODUCTION

This chapter of the EIAR comprises an assessment of the likely impact of the Proposed Development on the waste generated from the Proposed Development, as well as identifying proposed mitigation measures to minimise any impacts. The Proposed Development which is the subject of these 3no. concurrent planning applications consists of Site 3, Site 4 and Site 5. Dublin Central is underpinned by a Masterplan which will be assessed also.

This Chapter was prepared by Chonaill Bradley of AWN Consulting. Chonaill Bradley is a Senior Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over seven years' experience in the environmental consultancy sector.

A site-specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared by AWN Consulting Ltd. to deal with waste generation during the demolition, excavation and construction phase of this project (s) and has been included as Appendix 14.1. The C&D WMP was prepared in accordance with the 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006. A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the development (s) and is included as Appendix 14.2 of this chapter. These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

14.2 ASSESSMENT METHODOLOGY

The assessment of the impacts of the Proposed Development arising from the consumption of resources and the generation of waste materials, was carried out considering the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation is provided in the C&D WMP and in the OWMP provided in Appendix 14.1 and 14.2.

This Chapter is based on the Proposed Development, as described in Chapter 3: Description of Proposed Development and considers the following aspects: -

- Legislative context.
- Construction phase (including demolition, excavation & construction).
- Operational phase.

A desk study was carried out which included the following: -

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland.
- Description of the typical waste materials that will be generated during the construction and operational phases.
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the demolition, construction and operational phases of the Proposed Development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, the operating phase of this development, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the Proposed Development on the environment during the demolition, construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 6: Land, Soils and Geology. Chapter 6 of the EIAR also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the Proposed Development.

14.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended).

In addition, the Irish government issues policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the Irish and international waste context changing in the years since the launch of the previous waste management plan, "A Resource Opportunity" in 2012. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal.

The strategy for the management of waste from the demolition, excavation and construction phase is in line with the requirements of the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects published in 2006. The guidance document Construction and Demolition Waste Management: A handbook for Contractors and Site Managers was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans and reports including the EMR Waste Management Plan 2015 – 2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, 5. The Dublin City Council (DCC) Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws 2018, the EPA National Waste Database Reports 1998 – 2012 and the EPA National Waste Statistics Web Resource.

14.3 RECEIVING ENVIRONMENT

In terms of waste management, the receiving environment is largely defined by Dublin City Council (DCC) as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.

The waste management plan sets out the following targets for waste management in the region: -

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan.
- Achieve a recycling rate of 50% of managed municipal waste by 2020.
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "*70% preparing for reuse, recycling and other recovery of construction and demolition waste*" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The Waste Action Plan for a Circular Economy continues with this target of keeping the reuse, recycling and other recovery of construction and demolition waste at or above 70%.

The National Waste Statistics update published by the EPA in August 2020 identifies that Ireland's current progress against this C&D waste target is at 77% and our progress against 'Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)' is at 51%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive, however the EPA are yet to confirm that these were met.

The Dublin City Council Development Plan 2016 – 2022 also sets policies and objectives for the DCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, DCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

14.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

14.4.1 Dublin Central Masterplan

A full description of the development can be found in Chapter 3: Description of Proposed Development. The characteristics of the development that are relevant in terms of waste management are summarised below.

14.4.1.1 Demolition Stage

There will be a quantity of waste materials generated from the demolition and renovation of some of the existing buildings and hardstanding areas on site, as well as from the excavation of the building foundations.

Further detail on the waste materials likely to be generated during the demolition works are presented in the project-specific C&D WMP in Appendix 14.1. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the Proposed Development. The reuse, recycling/recovery and disposal rates have been estimated using the EPA National Waste Reports and these are summarised in Table 14.1.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	2027.9	0	0.0	85	1723.7	15	304.2
Concrete, Bricks, Tiles, Ceramics	11491.4	30	3447.4	65	7469.4	5	574.6
Plasterboard	901.3	30	270.4	60	540.8	10	90.1
Asphalts	225.3	0	0.0	25	56.3	75	169.0
Metals	3379.8	5	169.0	80	2703.9	15	507.0
Slate	1802.6	0	0.0	85	1532.2	15	270.4
Timber	2703.9	10	270.4	60	1622.3	30	811.2
Asbestos	7.0	0	0.0	0	0.0	100	7.0

Table 14.1: Estimated off-site reuse, recycle and disposal rates for demolition waste.

14.4.1.2 Construction Stage

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

In addition soil, stone, silt, sand and clay will require excavation to facilitate the basement and construction of foundations, along with the installation of underground services. The project engineers (Waterman Group) have estimated 163,490m^3 of material will need to be excavated to do so. There is limited chance for reuse of material onsite and it is envisaged that all material, will need to be removed offsite due to the limited opportunities for reuse on site.

These estimates will be refined prior to commencement of construction, or in the event that the Dublin Central Masterplan is amended. If the material that requires removal from site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011). In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the construction works are presented in the project-specific C&D WMP. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the Proposed Development and these are summarised in Table 14.2.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1631.9	10	163.2	80	1305.5	10	163.2
Timber	1384.6	40	553.9	55	761.5	5	69.2
Plasterboard	494.5	30	148.4	60	296.7	10	49.5
Metals	395.6	5	19.8	90	356.0	5	19.8
Concrete	296.7	30	89.0	65	192.9	5	14.8
Other	741.8	20	148.4	60	445.1	20	148.4
Total	**4945.1**		**1122.5**		**3357.7**		**464.8**

Table 14.2: Estimated off-site reuse, recycle and disposal rates for construction waste

In Addition to Table 14.2 the project engineers have estimated that c. 163,490m^3 of material will require excavation. It is envisaged that all of this material will be removed offsite for appropriate reuse, recovery and / or disposal. These estimates will be refined prior to commencement of construction.

14.4.1.3 Operational Stage

As noted in Section 14.1, an OWMP has been prepared for the development and is included as Appendix 14.2. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the buildings during the operational phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer / toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the development of the Dublin Central Masterplan for the main waste types based on the AWN WGM is presented in Table 14.3 below and is based on the uses and areas as advised by the project architects in April 2021.

Waste Type	Waste Volume (m^3/week)			
	Residential Units (combined)	Retail and Café / Restaurant Units (combined)	Hotel Units (Combined)	Office Units (Combined)
Organic Waste	1.14	5.28	2.49	2.81
Dry Mixed Recyclables	8.06	27.23	5.08	22.06
Glass	0.22	2.88	3.52	0.51
Mixed Non-Recyclables	4.24	42.09	5.95	26.77
Confidential Paper	-	-	-	4.19
Cardboard (For Baling)	-	55.65	-	21.34
Plastic (For Baling)	-	18.97	-	18.22
Total	**13.66**	**152.10**	**14.55**	**95.90**

Table 14.3: Estimated waste generation for the Proposed Development for the main waste types.

The residents and tenants will be required to provide and maintain appropriate waste receptacles within their units to facilitate segregation at source of these waste types. The location of the bins within the units will be at the discretion of the residents and tenants. As required, the residents and tenants will need to bring these segregated wastes from their units to their allocated Waste Storage Areas (WSAs). All WSA's can be viewed on the plans submitted with the application.

The OWMP seeks to ensure the development contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021 and the DCC waste Bye-laws.

Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the Proposed Development are summarised below.

14.4.2 Proposed Development Site 3, 4 & 5

A full description of the development can be found in Chapter 3: Description of Proposed Development. The characteristics of the development that are relevant in terms of waste management are summarised below.

14.4.2.1 Demolition Stage

There will be a quantity of waste materials generated from the demolition and renovation of the existing buildings and hardstanding areas on site, as well as from the excavation of the building foundations.

Further detail on the waste materials likely to be generated during the demolition works are presented in the project-specific C&D WMP in Appendix 14.1. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the Proposed Development. The reuse, recycling / recovery and disposal rates have been estimated using the EPA National Waste Reports and these are summarised in Table 14.4, 14.5 and 14.6

14.4.2.1.1 Site 3

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	361.8	0	0.0	85	307.6	15	54.3
Concrete, Bricks, Tiles, Ceramics	2050.5	30	615.1	65	1332.8	5	102.5
Plasterboard	160.8	30	48.2	60	96.5	10	16.1
Asphalts	40.2	0	0.0	25	10.1	75	30.2
Metals	603.1	5	30.2	80	482.5	15	90.5
Slate	321.6	0	0.0	85	273.4	15	48.2
Timber	482.5	10	48.2	60	289.5	30	144.7
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	**4021.5**		**741.8**		**2792.3**		**487.5**

Table 14.4: Estimated off-site reuse, recycle and disposal rates for demolition waste.

14.4.2.1.2 Site 4

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	244.4	0	0.0	85	207.7	15	36.7
Concrete, Bricks, Tiles, Ceramics	1384.7	30	415.4	65	900.1	5	69.2
Plasterboard	108.6	30	32.6	60	65.2	10	10.9
Asphalts	27.2	0	0.0	25	6.8	75	20.4
Metals	407.3	5	20.4	80	325.8	15	61.1
Slate	217.2	0	0.0	85	184.6	15	32.6
Timber	325.8	10	32.6	60	195.5	30	97.7
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	**2716.1**		**500.9**		**1885.7**		**329.5**

Table 14.5: Estimated off-site reuse, recycle and disposal rates for demolition waste.

14.4.2.1.3 Site 5

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	124.9	0	0.0	85	106.1	15	18.7
Concrete, Bricks, Tiles, Ceramics	707.6	30	212.3	65	459.9	5	35.4
Plasterboard	55.5	30	16.6	60	33.3	10	5.5
Asphalts	13.9	0	0.0	25	3.5	75	10.4
Metals	208.1	5	10.4	80	166.5	15	31.2
Slate	111.0	0	0.0	85	94.3	15	16.6
Timber	166.5	10	16.6	60	99.9	30	49.9
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	**1387.4**		**256.0**		**963.5**		**167.9**

Table 14.6: Estimated off-site reuse, recycle and disposal rates for demolition waste.

14.4.2.2 Construction Stage

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

In addition soil, stone, silt, sand and clay will require excavation to facilitate the basement and construction of foundations, along with the installation of underground services.

If the material that requires removal from site is deemed to be a waste, removal an reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011).In order to establish the appropriate reuse, recovery and/or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the construction works are presented in the project-specific C&D WMP. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the Proposed Development and these are summarised in Table 14.7, 14.8 & 14.9.

14.4.2.2.1 Site 3

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	308.4	10	30.8	80	246.7	10	30.8
Timber	261.7	40	104.7	55	143.9	5	13.1
Plasterboard	93.5	30	28.0	60	56.1	10	9.3
Metals	74.8	5	3.7	90	67.3	5	3.7
Concrete	56.1	30	16.8	65	36.5	5	2.8
Other	140.2	20	28.0	60	84.1	20	28.0
Total	**934.7**		**212.2**		**634.6**		**87.9**

Table 14.7: Estimated off-site reuse, recycle and disposal rates for construction waste.

In Addition to Table 14.7 the project engineers have estimated that c. 15,165m^3 of material will require excavation. It is envisaged that all of this material will be removed offsite for appropriate reuse, recovery and / or disposal. These estimates will be refined prior to commencement of construction.

14.4.2.2.2 Site 4

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	62.3	10	6.2	80	49.9	10	6.2
Timber	52.9	40	21.2	55	29.1	5	2.6
Plasterboard	18.9	30	5.7	60	11.3	10	1.9
Metals	15.1	5	0.8	90	13.6	5	0.8
Concrete	11.3	30	3.4	65	7.4	5	0.6
Other	28.3	20	5.7	60	17.0	20	5.7
Total	**188.9**		**42.9**		**128.2**		**17.8**

Table 14.8: Estimated off-site reuse, recycle and disposal rates for construction waste.

In Addition to Table 14.8 the project engineers have estimated that c. 132 m^3 of material will require excavation. It is envisaged that all of this material will be removed offsite for appropriate reuse, recovery and / or disposal. These estimates will be refined prior to commencement of construction.

14.4.2.2.3 Site 5

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	127.4	10	12.7	80	101.9	10	12.7
Timber	108.1	40	43.2	55	59.4	5	5.4
Plasterboard	38.6	30	11.6	60	23.2	10	3.9
Metals	30.9	5	1.5	90	27.8	5	1.5
Concrete	23.2	30	6.9	65	15.1	5	1.2
Other	57.9	20	11.6	60	34.7	20	11.6
Total	**386.0**		**87.6**		**262.1**		**36.3**

Table 14.9: Estimated off-site reuse, recycle and disposal rates for construction waste.

In Addition to Table 14.9 the project engineers have estimated that c. 5,593m^3 of material will require excavation. It is envisaged that all of this material will be removed offsite for appropriate reuse, recovery and / or disposal. These estimates will be refined prior to commencement of construction.

14.4.2.3 Operational Stage

As noted in Section 14.1, an OWMP has been prepared for the development and is included as Appendix 14.2. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the buildings during the operational phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer / toner cartridges, chemicals, textiles, waste cooking oil and furniture.