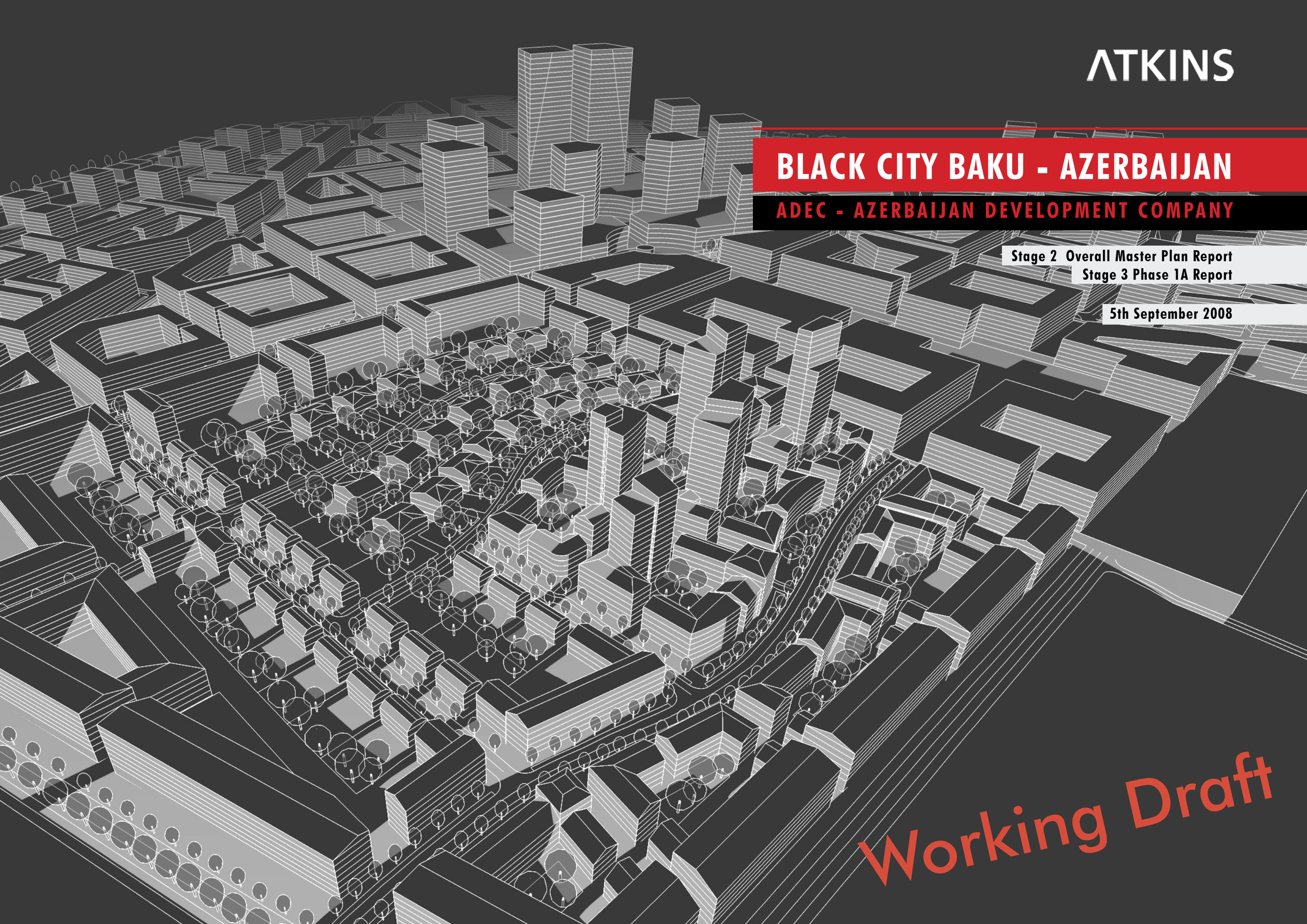
ATKINS

BLACK CITY BAKU - AZERBAIJAN

ADEC - AZERBAIJAN DEVELOPMENT COMPANY

Stage 2 Overall Master Plan Report
Stage 3 Phase 1A Report

5th September 2008



Working Draft

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1. INTRODUCTION

Background

The Black City development project is being undertaken by the Azerbaijan Development Company (ADEC). Atkins have been commissioned to prepare an overall master plan for the 230 hectare site located on the eastern edge of Baku, – the capital city of Azerbaijan. It represents the largest urban development opportunity in the centre of Baku Bay.

The site has a long history of oil production and industrial activity and currently accommodates decommissioned industrial facilities, informal housing and commercial activities, and areas of landfill and waste storage. The project area is divided into two main areas north and south of Nobel Avenue, the main transport artery linking the capital to the international airport.

Scope of Work

Atkins current commission compromises of four main stages of work:

- Stage One – Master Plan Review;
- Stage Two – Overall Master Plan;
- Stage Three – Phase 1, Detailed Master Plan;
- Stage Four – Phases 2 and 3, Detailed Master Plan.

Atkins were formally instructed to start work on Stages One and Two on 27th May 2008. Stage Three - Phase 1 was split into three sub-phases and the first Phase 1A the Client instructed Atkins to fast track in parallel with the overall master plan. The deadline for all of the tasks necessary to complete: Stages One and Stage Two, together with, Stage Three – Phase 1A, was fixed as early September 2008.

A report summarising the findings of Task 1.2 Master Plan Review was issued to the client on 18 June 2008, following three workshop meetings between March and May 2008. This document finalised the Concept Master Plan, and forms the basis for the Stage Two – Overall Master Plan.

Involvement of other Consultants

Following the appointment of Atkins as master planners of the overall development, the client instructed Foster and Partners, based in London, to provide them with strategic urban design advice on the master plan and to act as architectural advisors on the external envelope of the shopping mall being designed by F+A architects, based in Pasadena. Foster and Partners were also asked to identify a suitable location for two landmark towers close to the shopping mall and to prepare an initial concept design for them. Foster and Partners role was subsequently clarified to also include the preparation of the detailed master plan for the waterfront area to the south of Nobel Avenue. Refer to Figure 1.1.

Status of Master Plan

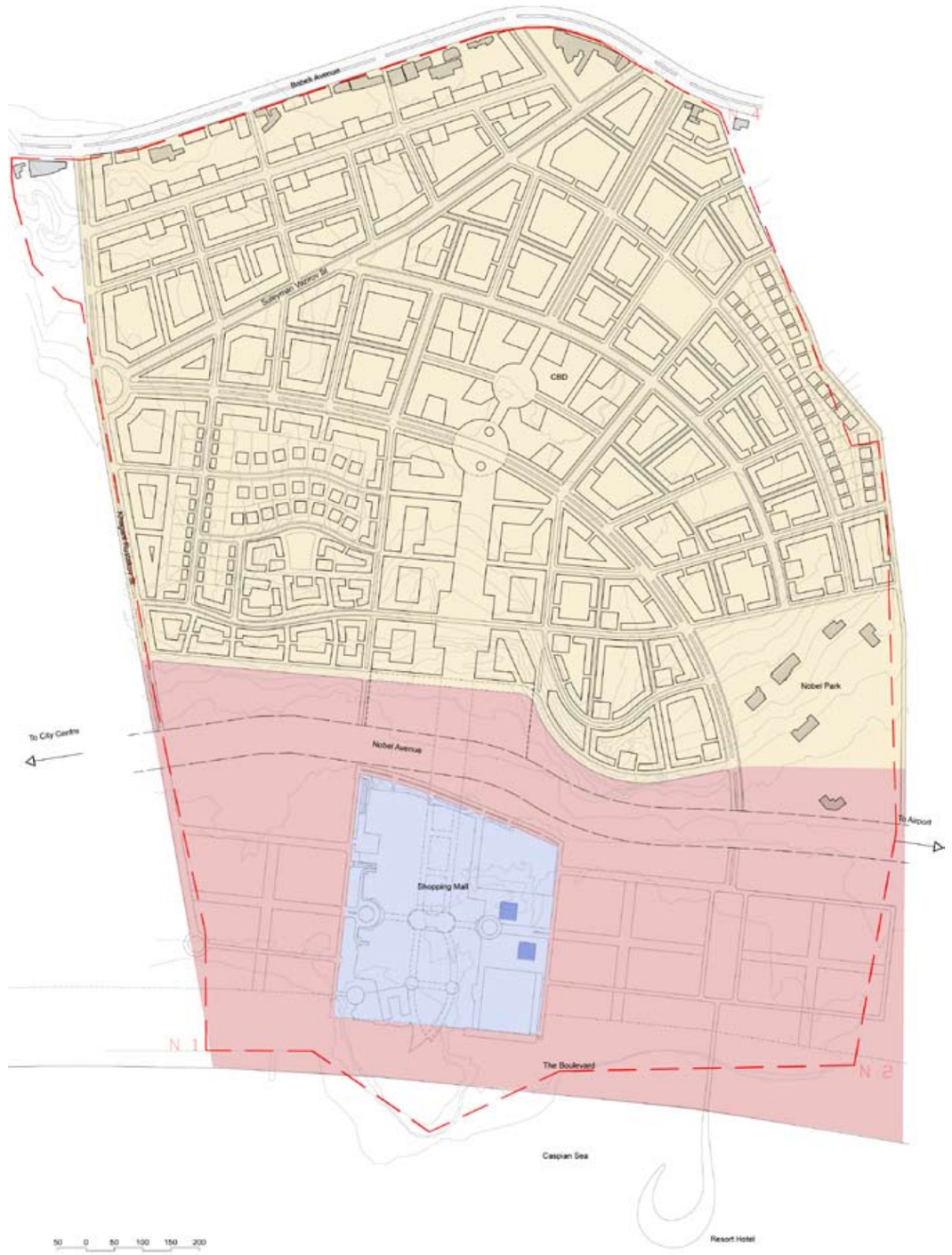
The involvement of Foster and Partners has impacted on the delivery of the overall master plan. An intense period of work has been undertaken by Atkins between June-August 2008 to develop those parts of the overall master plan not directly related to the shopping mall, or the waterfront.

This document summarises the work carried out to date and the status of the overall master plan as at the end of August 2008. The stage 2 master plan must, be considered as 'draft' until the two other design consultants have completed their tasks and the overall scheme properly coordinated. A presentation version, including computer generated visualisations, will be prepared once the overall master plan is finalised.

Phase 1A: The Garden District

The detailed master plan for Phase 1A - The Garden District - has progressed in parallel to the Stage Two work and is presented at within Chapter 10 of this report.

Figure 1.1 Consultants Involvement Plan



2. SITE APPRAISAL

LOCATION AND CONTEXT

Refer to Figure 2.1

The history of Baku dates back to 1st millennium BC. The first written reference to Baku dates from 885 and the name is interpreted as “wind blow”, “windy city” or “hill”, “city on a hill”. Located at the meeting-point of Europe and Asia it originated as a settlement around a port becoming a major transit point on the Caspian, developing like other medieval towns with its maze of narrow alleys, cobbled streets and ancient buildings surrounded by fortress walls. In December 2000, the Inner City of Baku with the Palace of the Shirvanshahs and Maiden Tower became the first location in Azerbaijan classifed as a World Heritage Site by UNESCO.

The site is situated to the east of the city centre and forms part of the historic Bibi-Heybat oilfield, the first oilfield in the world. Large scale oil development started in 1872. Investors quickly appeared in Baku among them the firms of the Nobel Brothers and Rothchilds. The project area includes Nobel Park which is named after its association with the Nobel Brothers Oil Producing Company, started in Baku in 1879. The park formed the setting for their residence, Villa Petrolea.

The oil boom triggered a rapid expansion of Baku. Fortunately, this growth was well planned with good infrastructure including parks, streets, public transportation and sanitation and public buildings including schools, hospitals, theatres and government buildings.

Over a relatively short period (1880-1920) an architectural transformation took place that altered the physical form and character of Baku. The oil barons built elegant private residences, and donated magnificent buildings for civic use. This period is characterised by an eclectic fusion of Eastern and Western architectural styles. Many prominent European architects were brought to Baku who introduced a range of European styles; for example the Italian Renaissance style of the Philharmonic Hall (1910-1912).

The oil boom came to a rapid halt when the Bolsheviks toppled the Democratic Republic of Azerbaijan and took over Baku in April 1920. This new era in the country affected every aspect of political, economic and social life, including urban planning and architecture.

Between the 1930’s and the mid-1950’s, City Planning was organised by Moscow, and Baku like other Soviet cities, was given a Master Plan. Many public buildings and infrastructure projects were undertaken at this time, heavily influenced by Modernists such as Le Corbusier.

Between the late 1950’s and the mid-1980’s large scale Soviet housing projects were completed in the suburbs of Baku. These were typified by wide avenues, standardization of building design and method of construction, including prefabricated construction elements.

Since Azerbaijan gained its independence in 1991, Baku has experienced a second oil stimulated building boom with high rise towers changing the character and skyline of the city. The increase in the density of the population in the centre of the city has brought problems in terms of traffic congestion and demands on gas, water and power supplies.

The site marks the historical boundary between the Black City of Baku typified by its oil production and industrial activities and the White City to the west which contains the main civic and cultural areas within the capital and the Inner City. It is bounded to the north by Babek Avenue, to the west by Khagani Rustanov Street and to the east by a cemetery and informal village development. Nobel Avenue the main traffic route connecting the city centre to the International Airport dissects the southern part of the project area. To the south of this busy highway the site extends to the under utilised waterfront facing onto the Caspian Sea.

View over the city centre of Baku

Figure 2.1 Location and Context

SITE CONSTRAINTS

Refer to Figure 2.2

Over a century of oil production and industrial activity on the site has left a legacy of pollution and redundant structures across the site. This includes circular tanks, storage lagoons and elevated pipelines. A detailed ground investigation and contamination study is required and survey work is currently being undertaken by the clients contractors.

The site also contains unplanned small settlements of tightly packed houses that have grown up to serve the neighbouring industrial activity. Many of these properties are in poor condition and without proper amenities.

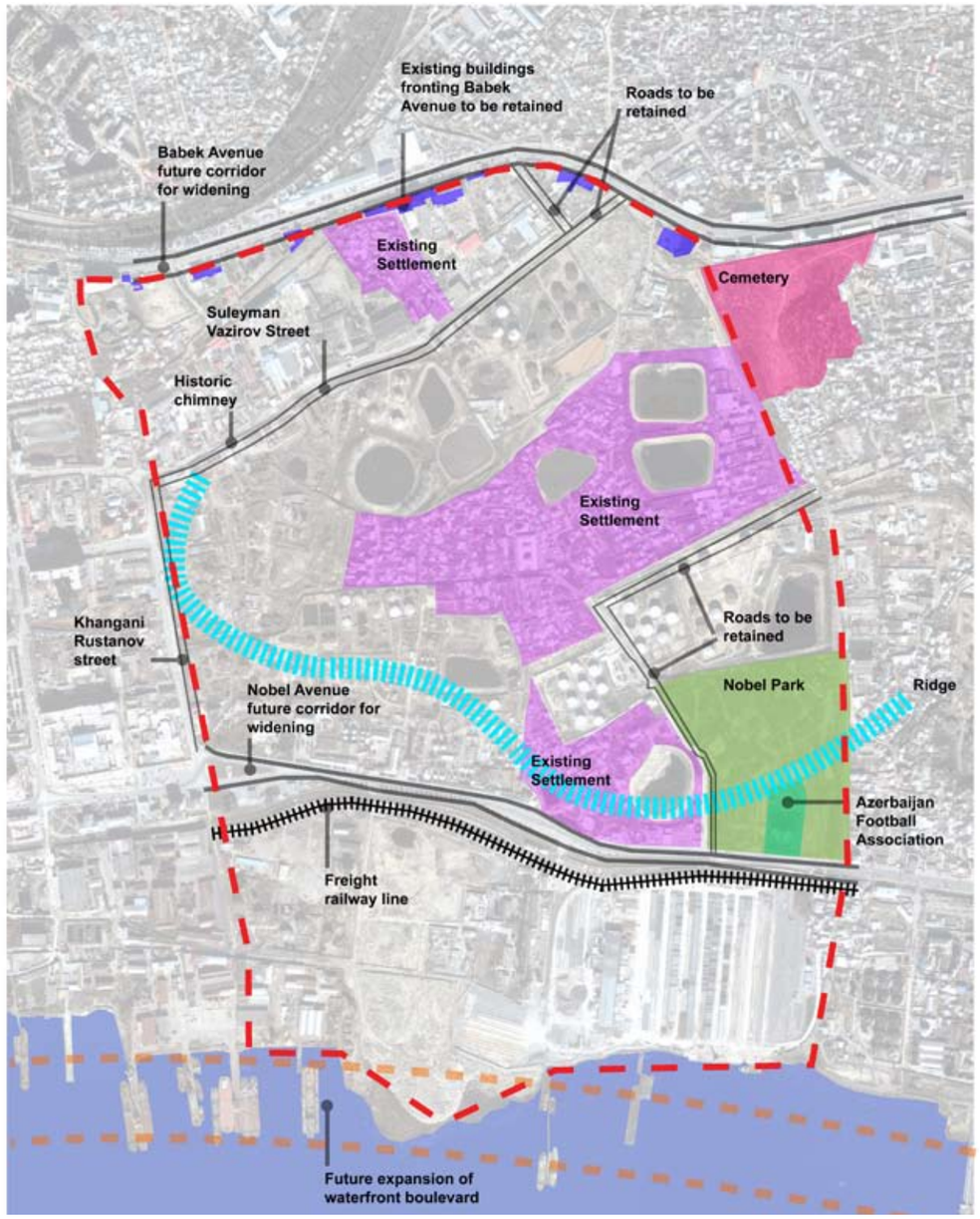
The site is crossed diagonally by Suleyman Vazirov Street which connects to Babek Avenue, the alignment of this public right of way is to be retained in the master plan. Similarly a smaller road connecting Babek Avenue to Suleyman Vazirov Street. The unnamed road which forms the western boundary of Nobel Park is also to be retained together with a road that connects this road to the eastern boundary.

There are plans to upgrade and widen both Nobel Avenue and Babek Avenue, sufficient space to accommodate these improvements is to be reserved in the master plan. Nobel Avenue in its present form presents a significant barrier to north-south movement.

A railway line serving the former industrial uses along the waterfront runs parallel to Nobel Avenue. In the early phases of development, the line needs to be retained. This places a constraint on the building footprint of the proposed shopping mall, and its access roads.

Earthquakes are one of the most serious threats to construction in Baku. The entire region is situated in an active seismic zone. Soil and geological tests will be essential to calculate the structural requirements for building foundations.

Figure 2.2. Site Constraints



SITE OPPORTUNITIES

Refer to Figure 2.3

The site occupies a strategic location at the centre of Baku Bay with 1.2 kilometres of prime waterfront. The Government's proposals to extend the City's waterfront boulevard to the east will create a continuous green corridor along the coast connecting the site to the city centre and the inner city.

If properly upgraded and enhanced visually Nobel Avenue presents a significant opportunity in terms of providing the setting for high quality commercial space at the new gateway to the city centre.

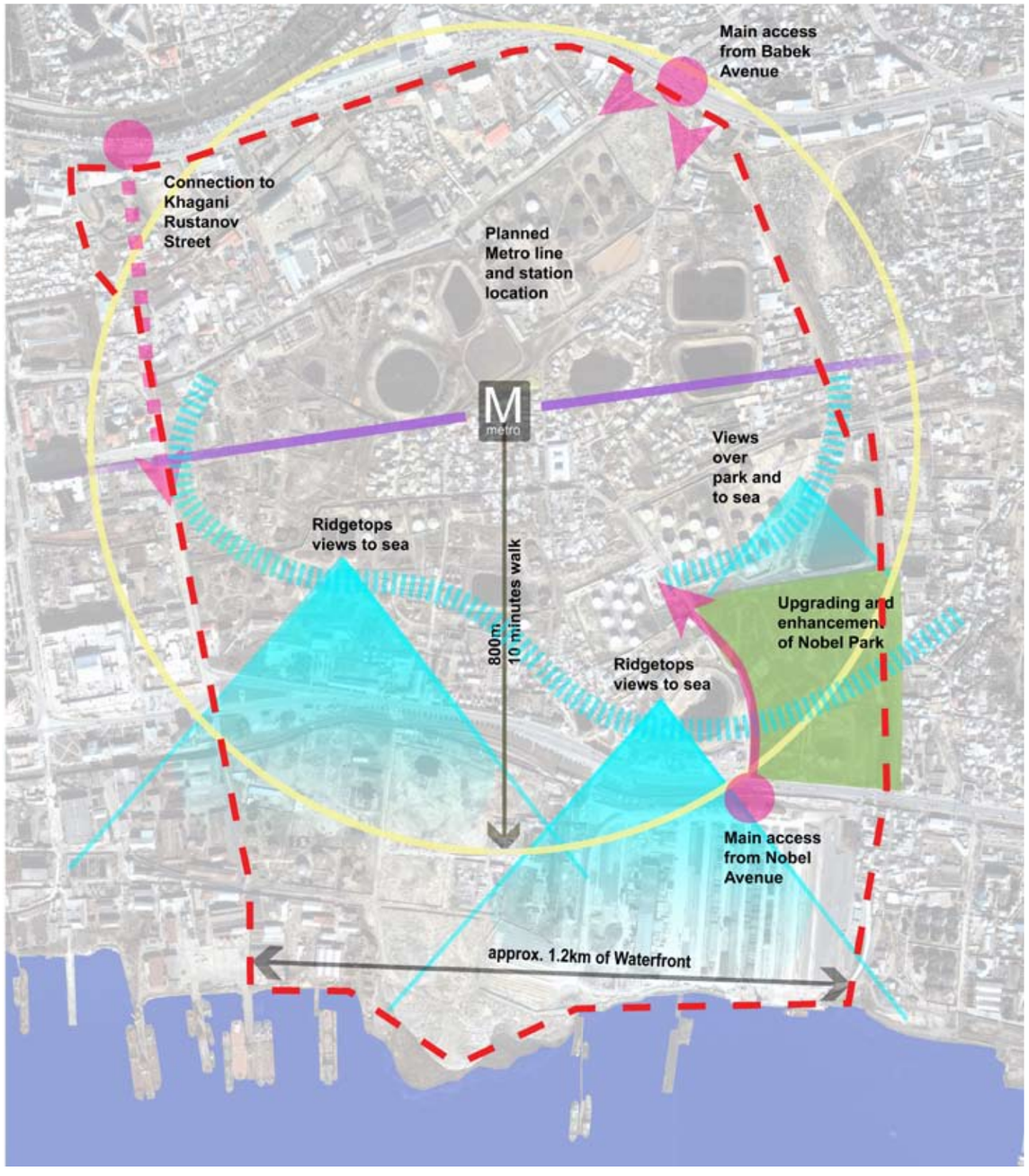
The planned extension of the city's underground metro system and the proposed location of a station in the centre of the project area to the north of Nobel Avenue is a major catalyst for development. The majority of the site to the north of Nobel Avenue is within a 10 minute walking distance of the future metro station.

The historic connection with the Nobel brothers and the heritage importance of Nobel Park and Villa Petrolea need to be properly respected. The park and its buildings are in need of sensitive conservation and restoration. It has the potential to be the icon for the new city district. The higher ground to the north and east of the park enjoys elevated views of this green oasis and the sea.

Several historical features remain on the site and it is the intention to retain, refurbish and incorporate several of these such as the old square section brick chimneys, into the new master plan where appropriate.

If properly upgraded and enhanced Nobel Avenue could become an attractive urban boulevard and gateway to the city centre

Figure 2.3 Site Opportunities

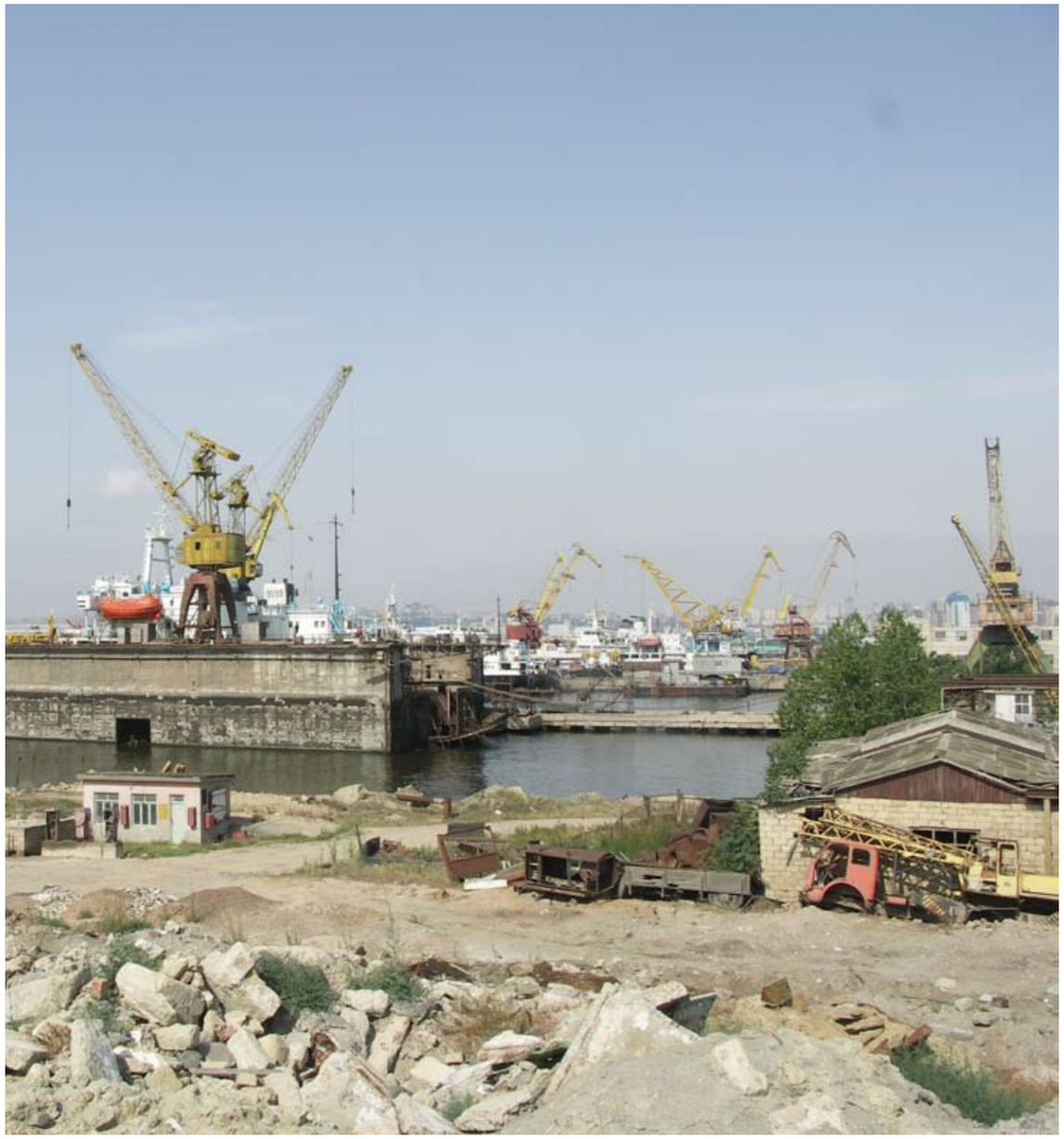


Existing housing in close proximity to storage tanks

Redundant structures

The site includes a number of holding ponds

Under utilised waterfront



3. VISION AND DEVELOPMENT CONCEPT

VISION

The primary objective of the Black City master plan is to create a new high quality urban quarter for Baku which acts as a catalyst for the regeneration of the city and the wider region. The vision for a new development at Black City described in this report aims to achieve this objective through the creation of a cohesive, carefully planned urban environment which offers a distinct character and a high quality of life for residents as well as the opportunity to attract and promote investment, generate jobs and strengthen the city's economy.

The scale of the development offers a unique opportunity to deliver a step-change in the quality of urban living in Baku, a development with highly sought-after residential areas, well connected commercial and business areas and high quality leisure facilities, linked together through a series of vibrant public squares, open spaces, streets and boulevards.

In summary, the key aspirations of the master plan are:

- Develop one of the greatest urban districts in the world
- Provide new high quality opportunities for inward investment
- Achieve a high level of vibrancy and urbanity
- Integrate multiple levels within the public realm
- Provide convenient and innovative transport options
- Make the most efficient use of land through optimizing development densities in response to patterns of accessibility
- Create a strong character and signature to the development and establish Black City as a destination in it's own right
- Connect to and enliven the surrounding city
- Create a district that aspires to the highest levels of sustainability in terms of land use, transport, energy and use of natural resources

DEVELOPMENT CONCEPT

The development concept for Black City has evolved directly from the Vision set out above, as well as from an understanding of the site's key opportunities and constraints as identified through the site appraisal. The concept is effectively for a high quality urban quarter, fully integrated into the existing urban fabric of Baku, whilst also enjoying a high degree of self-sufficiency and sustainability.

The main factors behind the concept are:

- A high quality commercial and business hub that will attract inward investment, create jobs for Azeri's and satisfy demand for commercial space in Baku;
- A range of high quality residential neighbourhoods, each with their own identity and sense of place, offering a range of accommodation types and developed to high architectural standards;
- A key retail attraction, developed as the premier destination in the region, which accommodates high-end shopping, cafes, restaurants and leisure opportunities;
- A new waterfront boulevard which, in the future, could extend to link with the existing boulevard in the city centre. The boulevard will act as the key interface between Black City and the Caspian Sea and will include a tramway linking the development with Baku city centre;
- high quality public spaces and boulevards, combined with a range of active ground floor uses, that animate and bring life to the development, creating a distinct character and 'vibrancy' throughout the development;
- A range of leisure attractions, including hotels, restaurants and cafes, which take advantage of the development's unique position on the Caspian Sea with views back to the old town;
- An enhanced Nobel Park which offers a new range of leisure attractions, a high quality landscaped environment and views of the Caspian Sea;
- Served by new and improved access roads from Nobel Avenue, Babek Avenue and Khangani Rustanov Street;
- Access locally by a hierarchy of roads and paths for private vehicles, public transport, cyclists and pedestrians, with a focus on prioritising for pedestrians and cyclists wherever possible; and
- A new district for Baku that delivers to the highest levels of sustainability through the creation of high quality public transport networks, a mix of land uses that reduces the need to travel and the innovative use of building design.

SUSTAINABILITY

A core principle for Black City is that the development will be socially, economically and environmentally sustainable. Achieving this goal means that the development must be socially diverse, economically active and environmentally sound whilst making efficient use of infrastructure, energy and other resources.

The master plan is inherently sustainable in terms of its structure and land utilisation. The development adheres to sustainability principles in the following ways:

- The remediation of significant ground contamination and pollution issues which currently exist on the development site
- The intensification of a key site, close to Baku city centre, which will utilise existing infrastructure and reduce the need for development on environmentally sensitive land outside of the city
- The development of a range of public transport options, including an underground metro system, and a waterfront, to reduce the reliance on the private car
- An urban structure and public realm which encourages walking and cycling throughout the development
- A mix of land uses which provides employment, entertainment and leisure opportunities, as well as a range of community facilities, within easy walking distance of residential areas, thereby reducing the need to travel
- A range of economic development opportunities to enable the growth and diversification of the economy of Baku and Azerbaijan
- The revitalisation of existing green spaces, including a range of new open spaces
- The 'greening' of streets and boulevards that will help to mitigate the effects of pollution emitted from vehicles
- A mix of residential unit types, in terms of size, target market and value, which will help to create vibrant, socially-mixed communities

SUMMARY DEVELOPMENT MIX

The quantum and typology of development has been derived in response to the development concept, the Client's aspirations and sustainability objectives as well as a result of a number of technical studies considering the approach to parking, the density strategy and potential building typologies.

The Consultants propose that a key feature of the master plan should be the provision of a balanced mix of uses (residential, employment, retail and community facilities), in order to create a sustainable, self-sufficient community where the need to travel is minimised.

In addition, the master plan has been deliberately developed at a relatively high density in order to create a compact urban area that utilises the existing developable area in the most efficient way possible. The relatively high density also allows a range of public transport modes to be supported and creates an environment where a range of uses can be located within close proximity to each other, thereby creating a vibrant urban area and a reduction in the need to travel.

Table 3.1 illustrates the estimated quantum and mix of development for the master plan as a whole. Section 5 considers the development mix in more detail, including the proposed land use, building heights and density frameworks, as well as consideration of the development mix in the northern section, developed by Atkins, and in the southern section, developed by Fosters.

Table 3.1 Summary of Development – Overall Master Plan

FLOORSPACE TYPE	GROSS FLOORSPACE (SQ.M)	%
Residential	4,211,048	79.1
Comparison Retail	351,385	6.6
Flexible Commercial Space	342,658	6.4
Office	416,443	7.8
Total	5,321,533	100.0
Estimated Dwellings	24,175	N/A
Estimated Population	79,270	N/A
Estimated Employment	26,207	N/A

CHARACTER AREAS

Refer to Figure 3.2

The proposed development has been split into eleven character a series of distinct neighbourhoods or character areas. The effective delivery of each of the character areas is crucial in order to realise the overall vision of the master plan. The following text sets out our vision of the key characteristics of each of the eleven areas.

Babek Avenue Strip

Babek Avenue is one of the main east-west routes along Baku bay serving the city centre. the section of road which forms the northern boundary of the site has been partly developed for showrooms and garages, which benefit from the large number of vehicles and customers passing each day. It is proposed to build on this character and strategic location and introduce further commercial development.

This area will accommodate larger scale retail premises, such as showrooms, bulk retail and restaurants, and would offer sufficient ground level car parking to service the units. The units would be served by a new commercial street running parallel to Babek Avenue allowing easy access from this key traffic route into the city centre.

Figure 3.2 - Character Areas

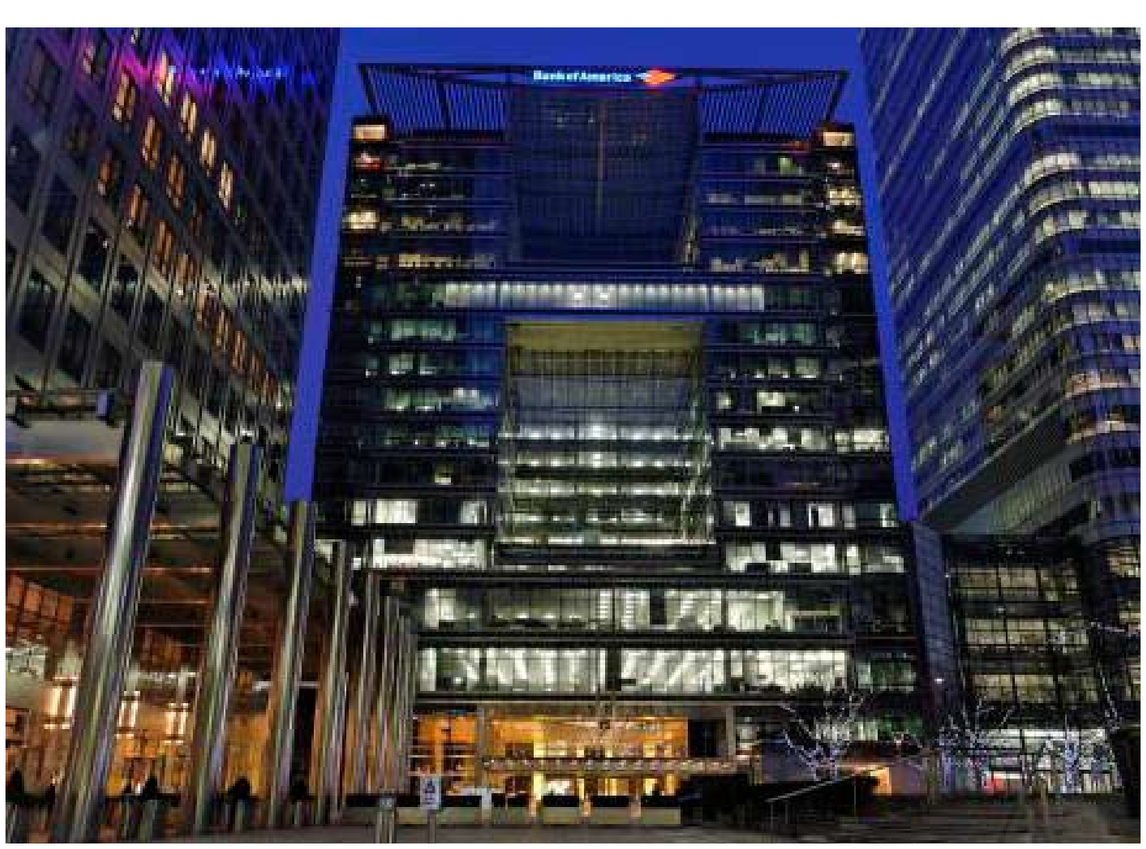
Central Business District (CBD)

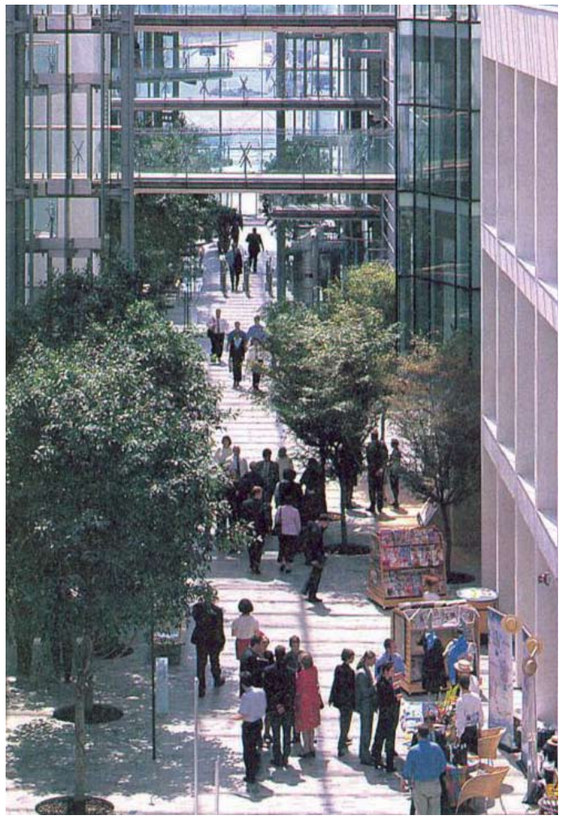
The proposed central business district area occupies the central part of the development in order to take advantage of the proposed location of the metro station. The proposed CBD site is within 10 minutes walk of the majority of the proposed residential areas north of Nobel Avenue.

The CBD would be characterised by a mix of uses including a large concentration of offices ground floor retailing, including restaurants and bars. Some community activities, a hotel and possibly residential uses could be included in this area.

The area would accommodate the largest concentration of tall buildings in the master plan area, with towers of up to 40 stories located on top of podiums. Parking would be contained within the podium block and accessed from the outer perimeter of the CBD. There would be an emphasis on animating this downtown area with active open spaces and a lively evening economy.

The main north-south and east-west routes through the CBD would be free of cars and sheltered from the elements. This could include an indoor galleria.





Babek Quarter

The Babek Quarter the single largest character area within the development, will accommodate a range of high and medium and residential accommodation centred around the CBD. A key feature of this district will be the strong landscape framework to create its garden character.

High density residential blocks, varying between 8 and 12 stories, would be located closest to the CBD area to take advantage of the good public transport accessibility offered by the metro station. These residential developments would take the form of a 'perimeter block', allowing maximum interaction with the street and an internal courtyard space to accommodate parking and shared landscaped/garden areas. Medium density blocks, of between 4 and 8 stories, would be located between the high and low density areas.

Local amenities, such as, convenience shops, health facilities and primary schools will need to be located within this area.

Garden District

The Garden District will be characterised by a very high quality, mainly residential environment. The district will contain a variety of detached villas, medium rise and high rise apartments; the latter with wide views of the Caspian Sea. More than any other district in Black City, greenery will be the predominating feature; elegant tree-lined streets and avenues will be matched with rich, maturing trees and shrubs in public parks and in the private or shared gardens of apartments and villas. In addition to residential, the Garden District will contain a small amount of commercial floor space along the main arterial roads that circumscribe the district, as well as at the very heart of the district. It is likely that the land uses here will be retail at ground floor with offices and/or residential above and for the most part, these uses will serve the immediate community. Central Avenue - the most characteristic and high-profile new shopping street in Black City - will run directly to the north of the district, forming its northern boundary.







Central Gardens

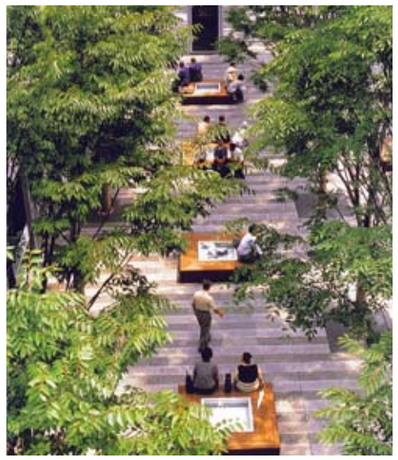
A key feature of the original development concept was a north-south open space connecting the CBD to the Shopping Mall via a bridge over Nobel Avenue. In earlier versions of the scheme this was interpreted as an extensive plaza. After consideration it has been decided to reduce the width of the linear open space and to frame the park with civic and community buildings, together with apartments. The sloping topography allows the park to be terraced, maximising south facing views to the sea.

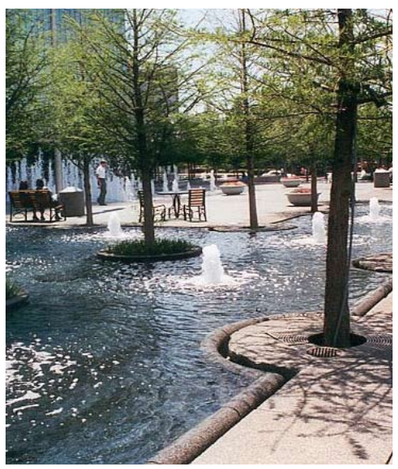
Nobel Heights

The Nobel Heights area would accommodate a range of high and medium density residential blocks between 10 and 12 storeys.

The topography of the site and its location close to Nobel Park would allow the development of an exclusive “high-end” residential development. The overall aspiration here is to create a “lifestyle” environment of high quality development and amenitie’s appealing to the “high-end” residential market, to the retired community (be it local or international), and to investors.

The ridge tops and hills would be articulated with apartment buildings which would enjoy excellent views of the Caspian Sea and Nobel Park.

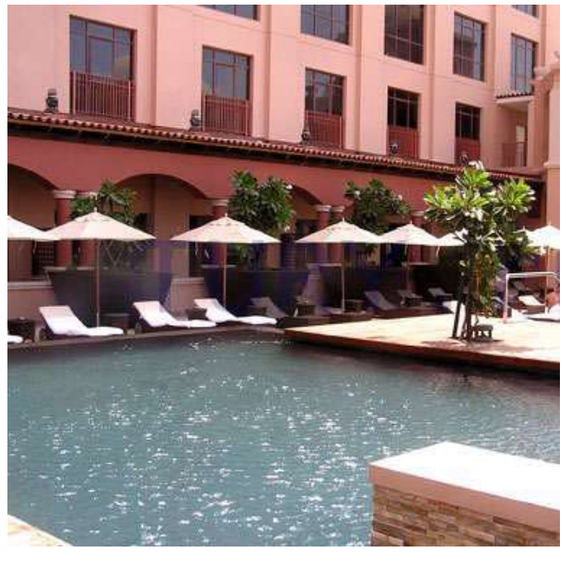




Shopping Mall

The shopping mall, currently being designed by F&A Architects, will accommodate a range of high-end and multiple retailers and will contribute a major new addition to the retail offer of the city. A landmark bridge is proposed to link the Central Gardens with the second floor of the shopping mall enabling easy access over Nobel Avenue. This walkway would then run through the shopping mall to enable access to the Boulevard fronting onto the Caspian Sea.

Adjacent to the shopping mall will be a pair of iconic towers, which could be comprised solely of office floorspace or a mix of residential apartments and offices. The location of these landmark buildings close to the waterfront would mean they are visible in views across the bay from the city centre. The towers will differ in height between 30 to 40 storeys.

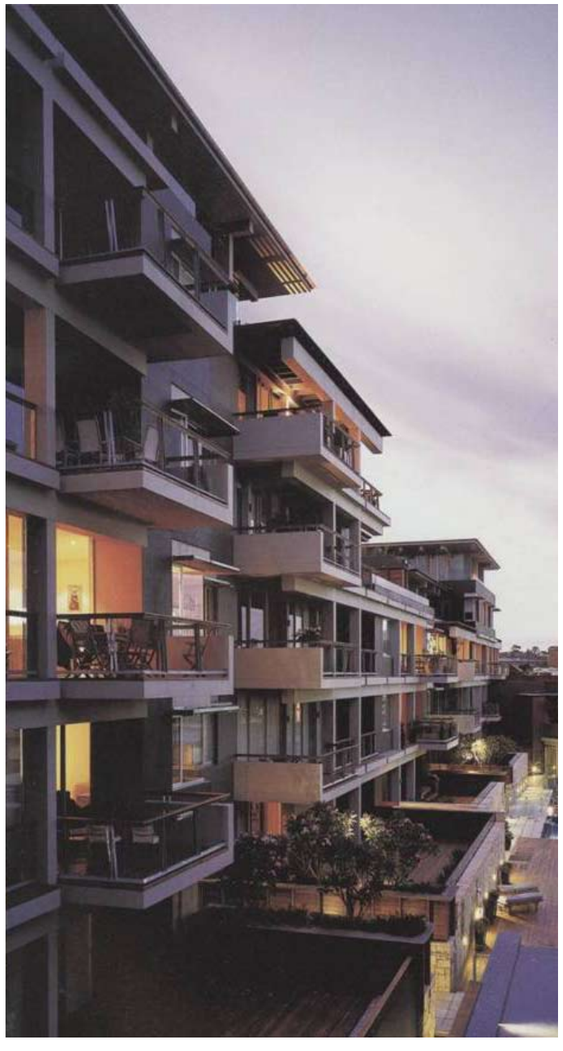


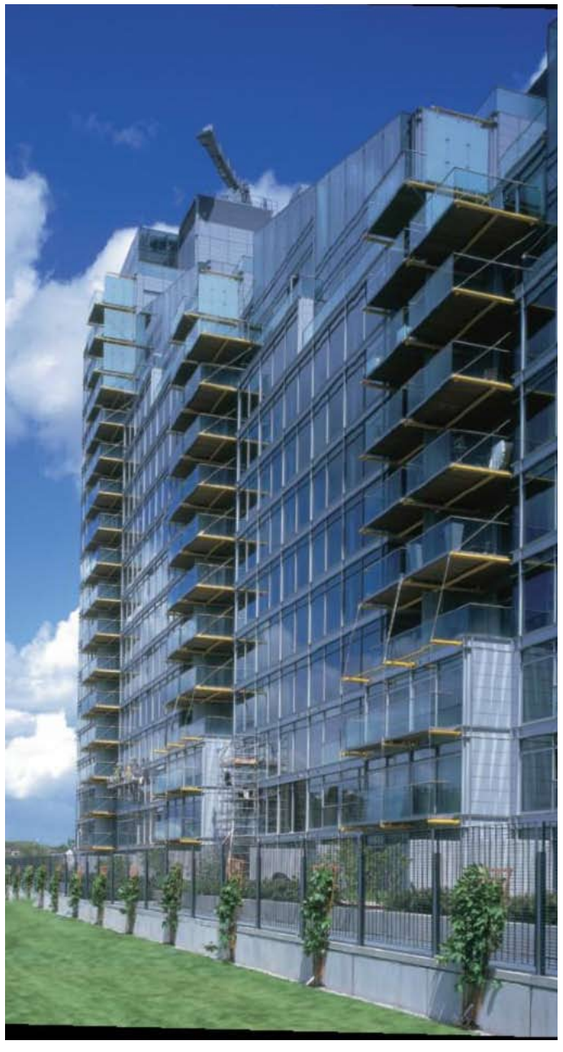
Waterfront East and Waterfront West

The Waterfront areas are comprised of a mix of high density residential areas, up to 12 stories, and mixed use blocks, of up to 20 stories, on the northern and southern edges.

The mixed use areas towards the waterfront would include a range of leisure and retail uses on ground floors with some residential units above. There is potential for a hotel within this location.

These neighbourhoods could justify some local service provision such as primary schools, health and child care.





The Waterfront Boulevard

The Waterfront Boulevard will become a continuous publicly accessible promenade linking Black City eastwards to the city centre and ultimately connecting westwards as the revitalisation of the waterfront continues around Baku Bay.

The revitalisation of the Black City waterfront provides the opportunity to create a vibrant water-related public destination with a variety of experiences and amenities along its length. A tramway linking the extended boulevard and shopping mall to the city centre is also proposed.

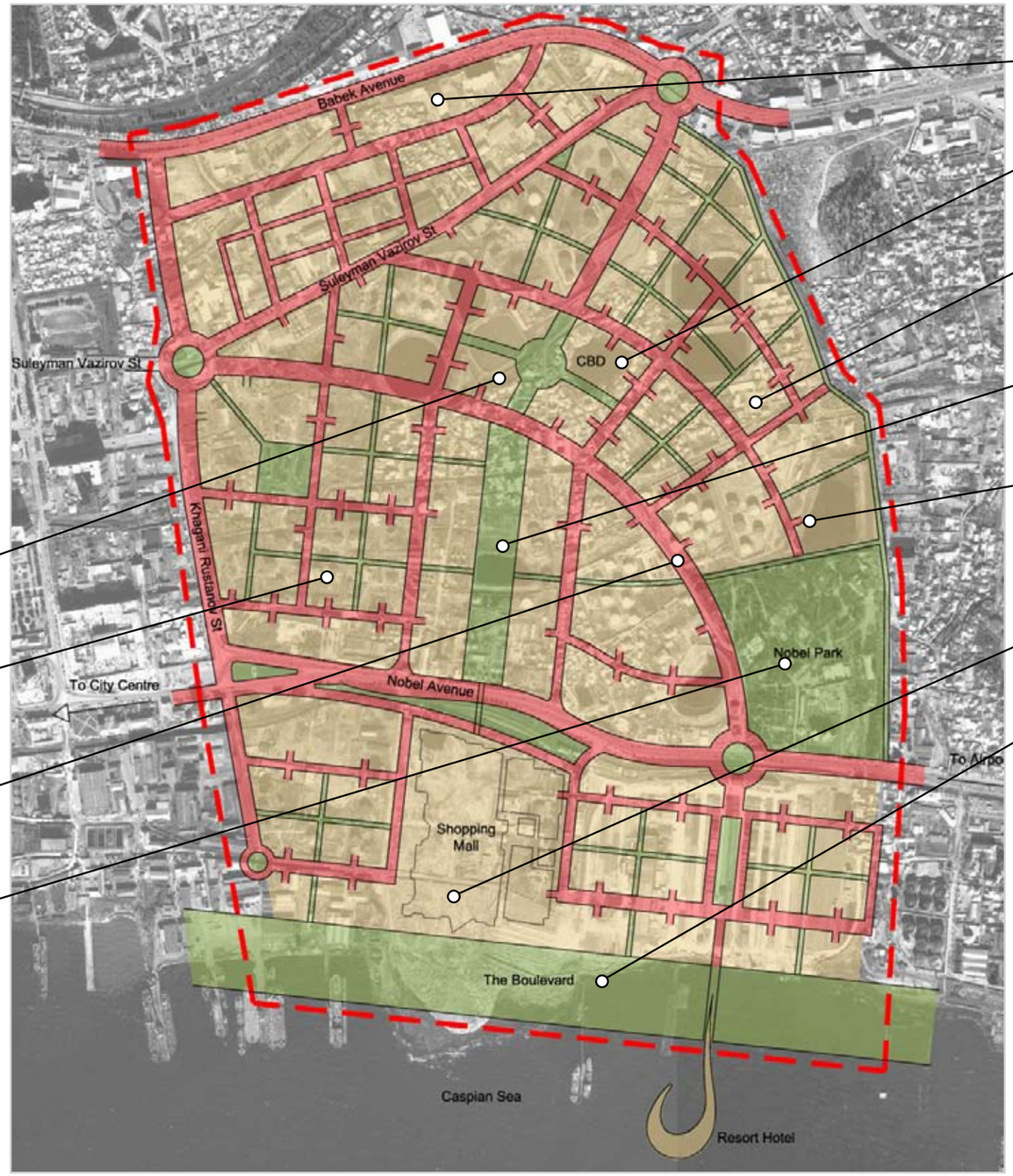
Figure 4.1 - Preferred Option, June 2008

A central business hub that will attract investment and satisfy demand for commercial space near Baku city centre. The business hub has been allocated around 10ha of land in line with the Client's aspirations.

A highly sought after residential development offering a range of accommodation from villas set within tree-lined streets to traditional medium-rise apartments, all of which will be developed to high architectural standards

The creation of distinguished, high quality landscaped avenues which are seen as destinations in their own right and will create a strong sense of identity within the development

A series of parks and high quality public spaces for the people of Baku and the city's visitors, including the refurbishment of Nobel Park



The development of commercial showrooms to complement the existing retail uses which front Babek Avenue

The CBD based on the future metro stop, which will enable fast connections to central Baku and other parts of the city, as well as reducing the need to travel by car.

An urban block structure of approximately 100m x 100m in residential areas, in line with the traditional urban form of the surrounding area

The key nodes of the CBD and the shopping mall are linked by Central Gardens. This important open space would act as a mixed-use civic quarter, serving the nearby residential areas.

A limited number of internal access roads to reduce the dominance of the car, instead relying on the concept of internal access courtyards to enable secure parking and improving the public realm for pedestrians.

A key commercial attraction which offers high-end retail as well as the potential for cafes, restaurants and leisure opportunities where the building opens out onto the Caspian Sea.

A new waterfront boulevard which in the future could extend to link with the existing boulevard in the city centre. This may include a tramway linking the development with the rest of the city

0 200m 400m 600m 800m 1000m

N

KEY

- Highways
- Public Realm and Open Space
- Developable Land

4. DESIGN DEVELOPMENT

PREFERRED OPTION 18 JUNE 2008

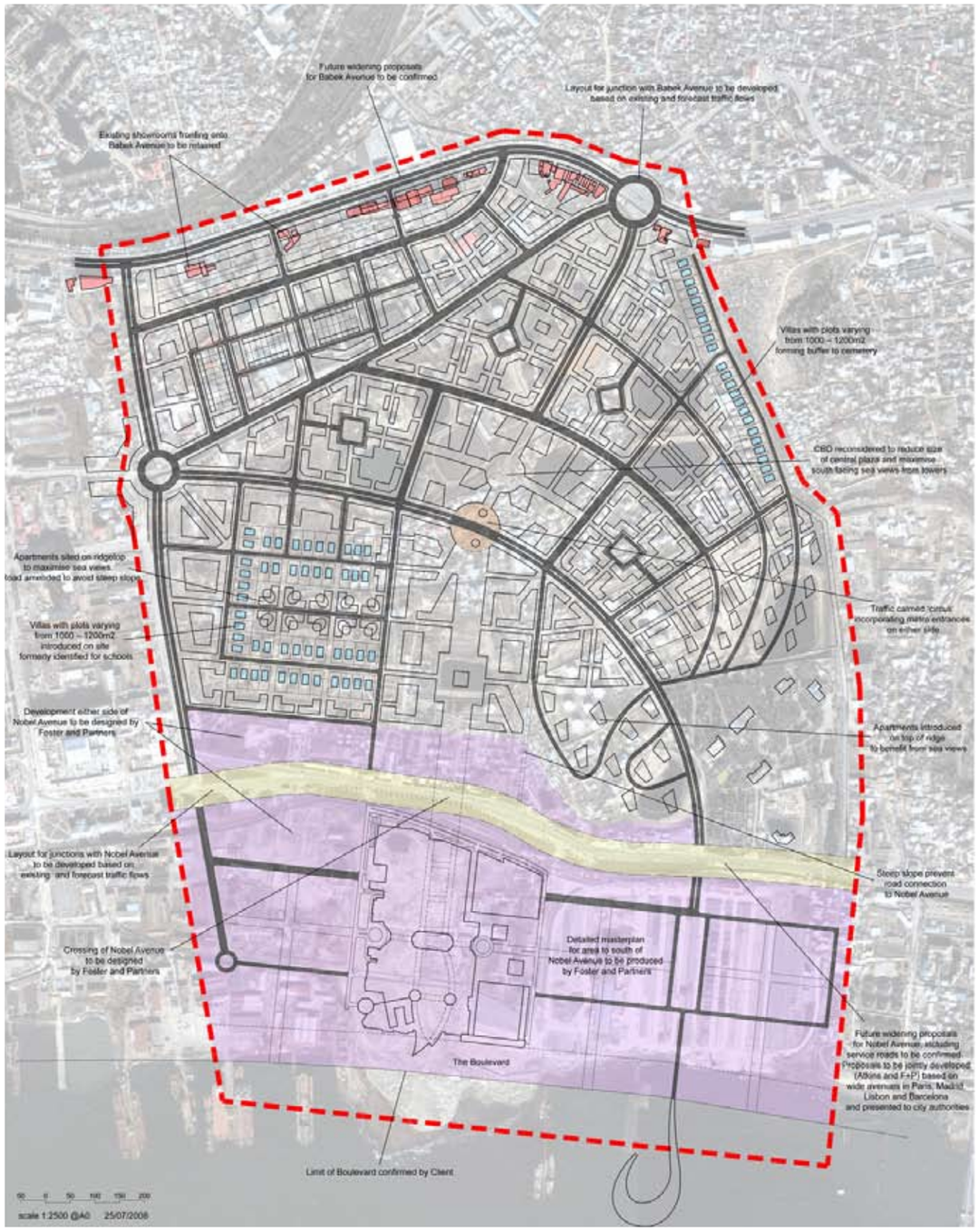
The preferred option set out in the June Task 1.2 Master Plan Review report (refer to Figure 4.1) was evolved directly from our understanding of the Client's aspirations for the site, as identified during the three workshops on the 11 March, 17 April and 27 May 2008.

17 – 18 JULY 2008 CLIENT WORKSHOP

At the Client workshop held at Foster and Partner offices on 17 – 18 July 2008 Atkins presented a more developed version of the overall master plan submitted in the 18 June 2008 Task 1.2 Master Plan Review report. The Client requested the following main amendments to this plan:

- The deletion of sites to be reserved for primary and secondary schools;
- Roundabouts to be replaced with signal controlled junctions, wherever possible;
- Waterfront boulevard to reflect existing character of boulevard in Baku;
- Explore opportunity for sea views on ridgetop within Phase 1A;
- Removal of villas shown to north of Suleyman Vazirov Street, grouping of villas in two locations within the heart of Phase 1A and on the eastern boundary to provide a buffer to the cemetery;
- Simplify Central Gardens area , built form as shown over complicated;
- Metro entrances to be in Central Plaza either side of Central Avenue.

Figure 4.2 Amendments : July Workshop



14 AUGUST 2008 CLIENT WORKSHOP

At the Client workshop held at Atkins' offices on 14 August 2008 an amended version of the overall master plan was tabled, taking on board the Client comments from the previous workshop. There was detailed discussion of the Phase 1A area, for which a sketch model at 1:500 scale had been prepared. The main changes requested by the Client were:

Phase 1A

- Adjustments to Phase 1A layout to maximise sea views from ridgetop apartments. Lowering of height of apartments to provide a better transition with villas;
- Deletion of unnecessary sections of road including sections with steep gradients;
- Widening of road to connect Khagani Rustanov Street and the underground car park beneath the Central gardens;
- Clarification of plot sizes of villas to be 1000 – 1200 m^2.

Remainder of Master Plan

- Reconsideration of pedestrian streets and squares within residential areas;
- Inclusion of existing road to the north of Nobel Park, and resulting changes to the layout;
- Reconsider building typologies for commercial street running parallel to Babek Avenue, with offices above showrooms;
- Add existing road connecting Suleyman Vazirov Street to Babek Avenue and adjust layout;
- Client to advise on alignment at northern extension to Khagani Rustanov Street and its junction with Babek Avenue;
- Liaise with Foster and Partners regarding width of Waterfront Boulevard.
- Liaise with F+A regarding modified footprint of shopping mall.

Figure 4.3 Amendments : August Workshop

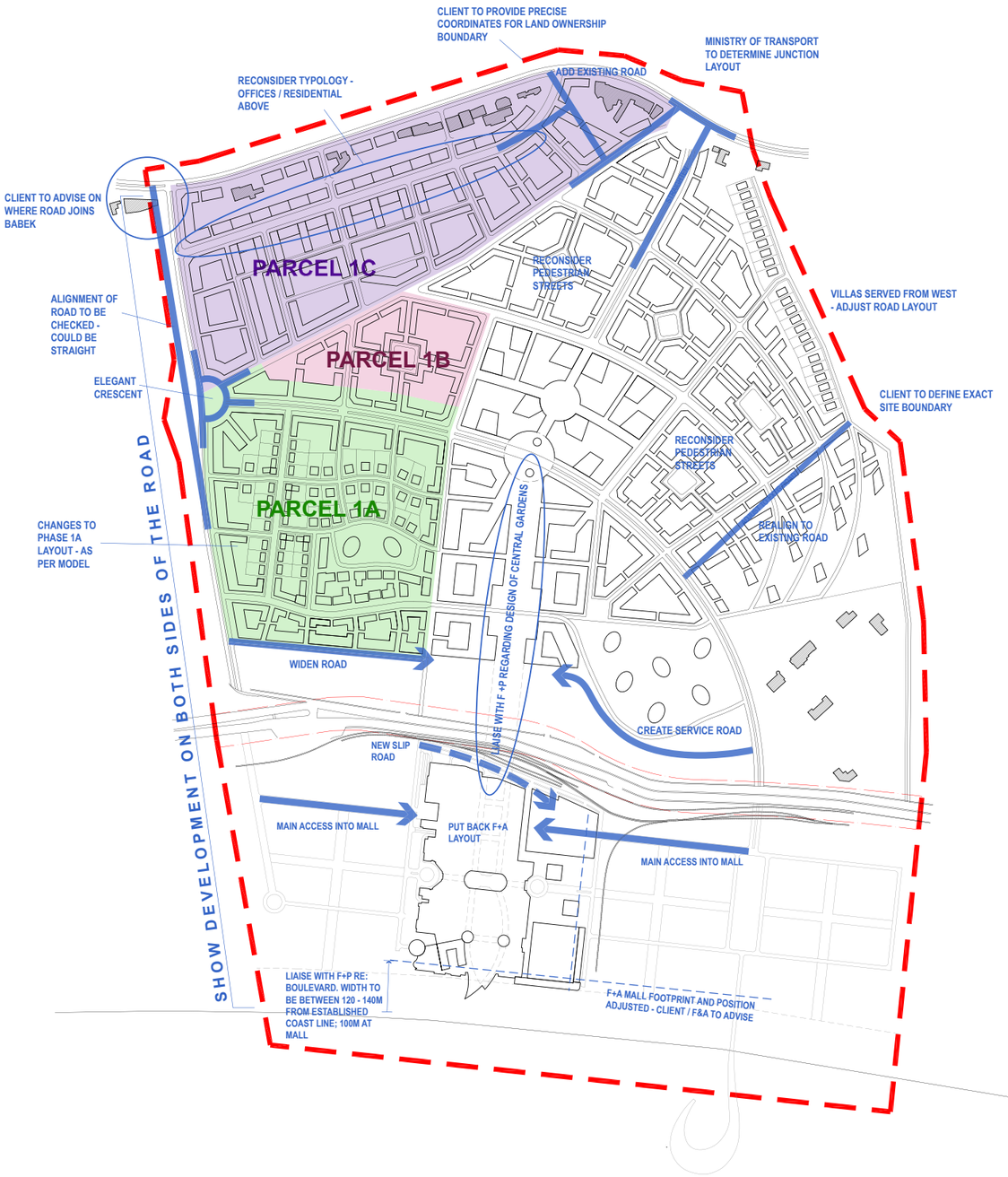


Figure 4.3 Amendments : August Workshop

Figure 4.4 Final Master Plan

FINAL MASTERPLAN

The final version of the overall master plan takes account of the Client comments received during the July and August workshops. The master plan also includes detailed designs for the Phase 1A area. The key changes to the final overall master plan are:

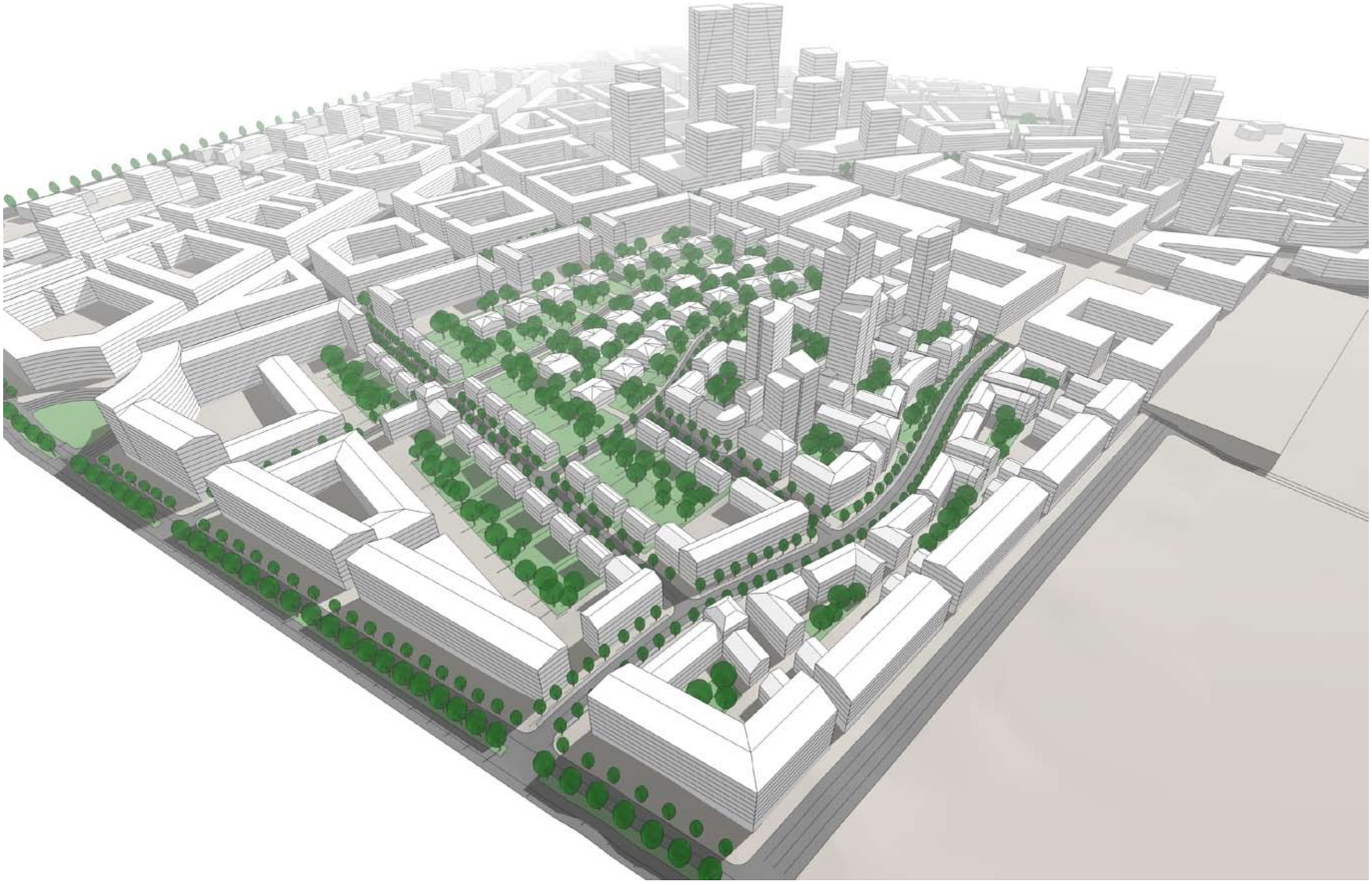
Phase 1A

- Adjustments to plot sizes of villas and mansion houses
- Reconfigurations of blocks to maximise layout and efficiency
- Reconfiguration of road network, including connection between Khagani Rustanov Street and underground car park beneath Central Gardens.
- Adjustment of building heights and reconfiguration of layout within ridgetop towers in order to maximise sea views
- Target GFA of 32,000 sq.m per developable hectare

Remainder of Master Plan

- Reconfiguration of pedestrian squares within residential blocks
- Reconfiguration of villas in east of master plan, including new access road
- Inclusion of 12 storey towers with showrooms on lower floors in Babek Avenue Strip
- Inclusion of flexible commercial space on ground floors
- Adjustment of layout at north eastern corner, including new road junction
- Service road provided at southern edge of master plan, just north of Nobel Avenue

Figure 4.5 View of the Master Plan from the Garden District



5. LAND USE FRAMEWORK

The central objective for the Black City development is to create a vibrant mixed-use urban quarter that is fully integrated into the existing urban fabric of Baku. The development has been deliberately planned to be relatively high density, supported by an efficient public transport network, which will contain a wide mix of scales and uses. It will contain a diversity of employment and residential functions, which allow it to operate as a viable and sustainable urban neighbourhood, along with a public realm that makes it a significant public destination.

DEVELOPMENT MIX

Section 3 set out a summary of the level of estimated level of development. This section looks in greater detail at the mix of development within each of the character areas, as well the split between the northern section, and the southern section.

Given that the development may take some years to reach full completion, and that the market for different types of floorspace is very difficult to plan for within this period, it is essential that the master plan takes a flexible approach to the eventual mix of floorspace that will be accommodated when fully complete. For this reason, the estimates of potential floorspace shown in Figure 5.1 should be considered as a guide rather than as definitive account of the exact scale and mix of floorspace proposed.

It is also important to note that the estimates of floorspace shown for the overall master plan are derived using assumptions of the scale and mix of development that will take place in the southern part of the master plan, which is currently being developed by Foster and Partners and which has not yet been finalised. We have assured that the scale of development within the overall Master Plan would be the equivalent of **at least 32,000 sq.m of gross floorspace per developable hectare**, which is the equivalent on an FAR of around 2.7. The total scale of development in the southern section has been assumed to be similar to that in the northern section, although this is liable to change as the southern section is progressed.

Figure 5.1 illustrates that, based upon the above assumptions, it is estimated that the development will accommodate an **estimated 5.32million sq.m of gross floorspace**. Residential uses will comprise the largest proportion of the total amount of floorspace (79%). However, significant proportions of office floorspace (8%) and comparison retail space (7%) have also been allowed for in the master plan.

In addition, a further category of 'flexible commercial floorspace' has also been taken into consideration, which makes up the final 6% of floorspace. This category takes account of the potential for ground floor uses in a majority of buildings to accommodate a range of retail, entertainment, community facilities and other services, for which the market demand for each is currently uncertain.

Figure 5.1 – Floorspace Mix within Overall Master Plan

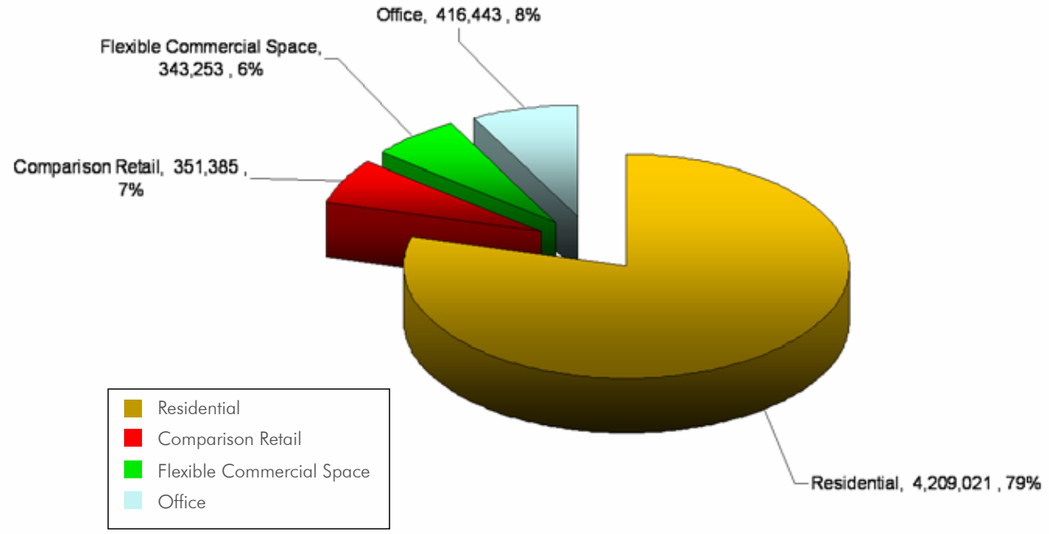
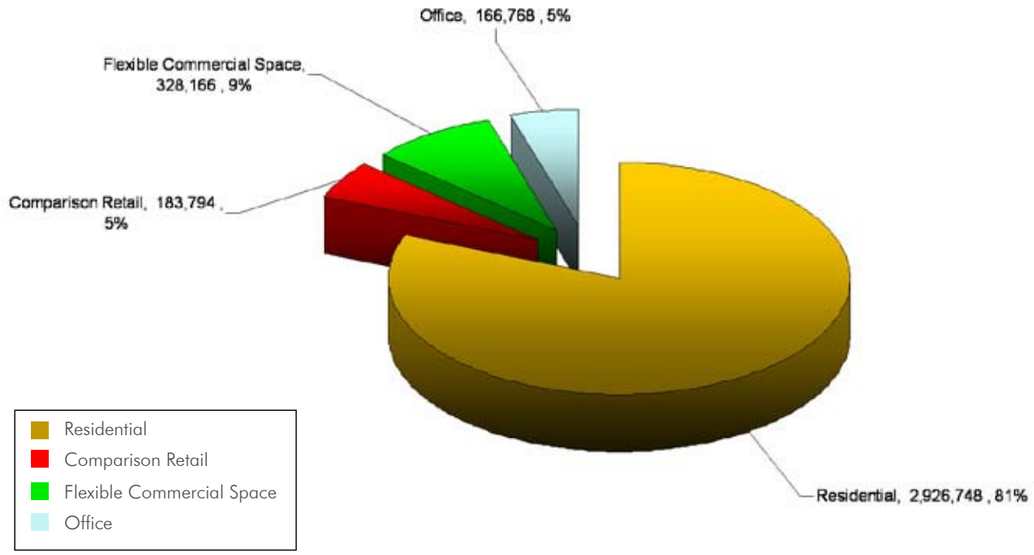


Figure 5.2 illustrates the floorspace mix within the northern section of the master plan. The table shows that **the northern section could accommodate an estimated 3.61 million sq.m of floorspace.** As with the overall master plan, residential uses will comprise the majority of floorspace, with smaller, but significant, proportions of comparison retail, office and flexible commercial space. The key difference between the northern section of the master plan and the master plan as a whole is that the northern section has a greater proportion of residential uses, with a lower proportion of comparison retail and offices as a result.

Figure 5.2 Floorspace Mix within Northern Section



FLOORSPACE MIX BY CHARACTER AREA

Figure 5.3 illustrates the mix of floorspace within the northern section of the master plan by Character Area. The figure illustrates that the CBD will have the largest proportion of both office and comparison retail floorspace, in order to take advantage of the excellent public transport accessibility offered by the metro station. Other areas will have a greater proportion of residential floorspace, as well as flexible commercial floorspace to accommodate local retail and community facility provision. The land use framework is illustrated in more detail in the next section. This report does not look in detail at the exact floorspace mix that may be accommodated within the southern section, as this is currently still under development with Foster and Parners at the time of writing.

Figure 5.3 Floorspace by Character Area

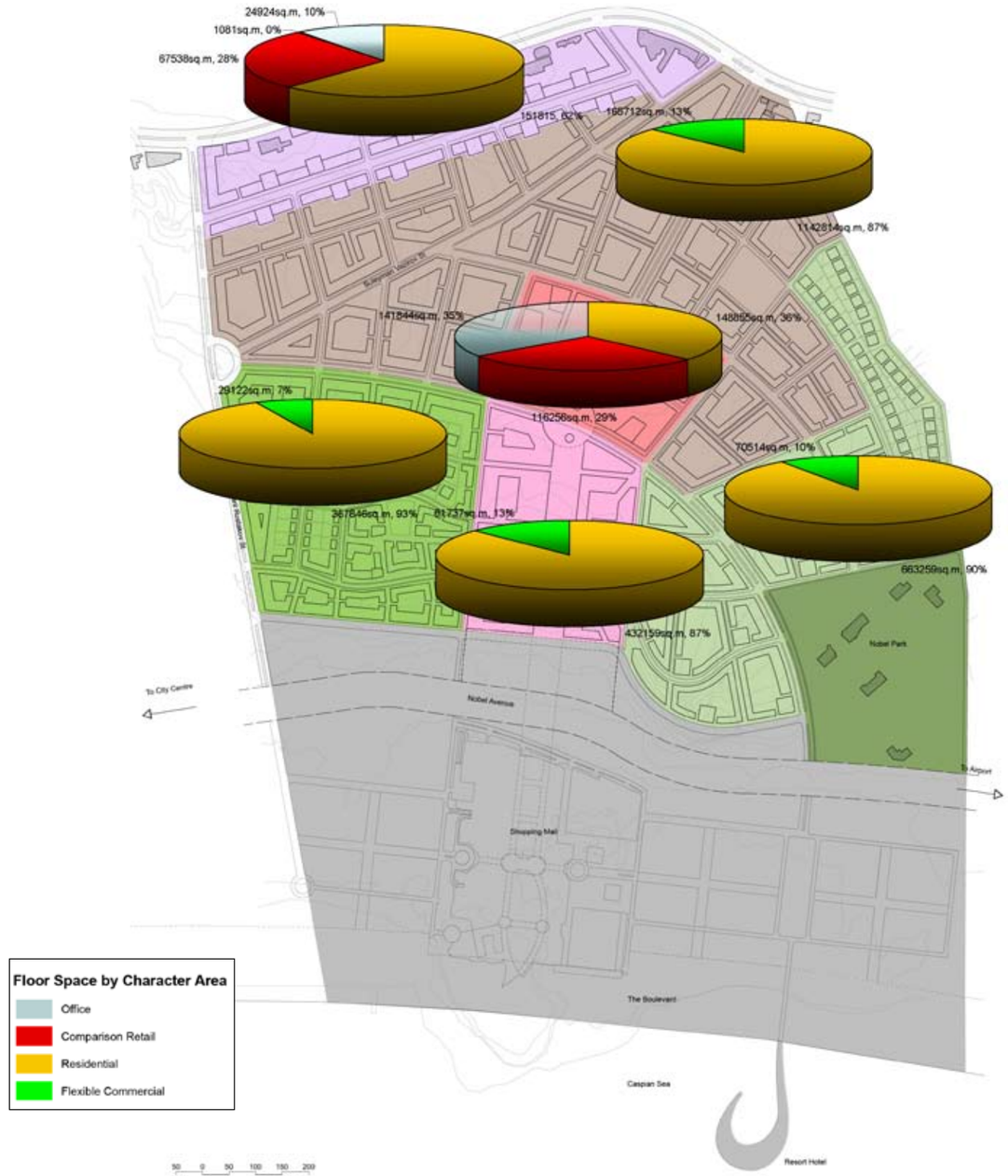
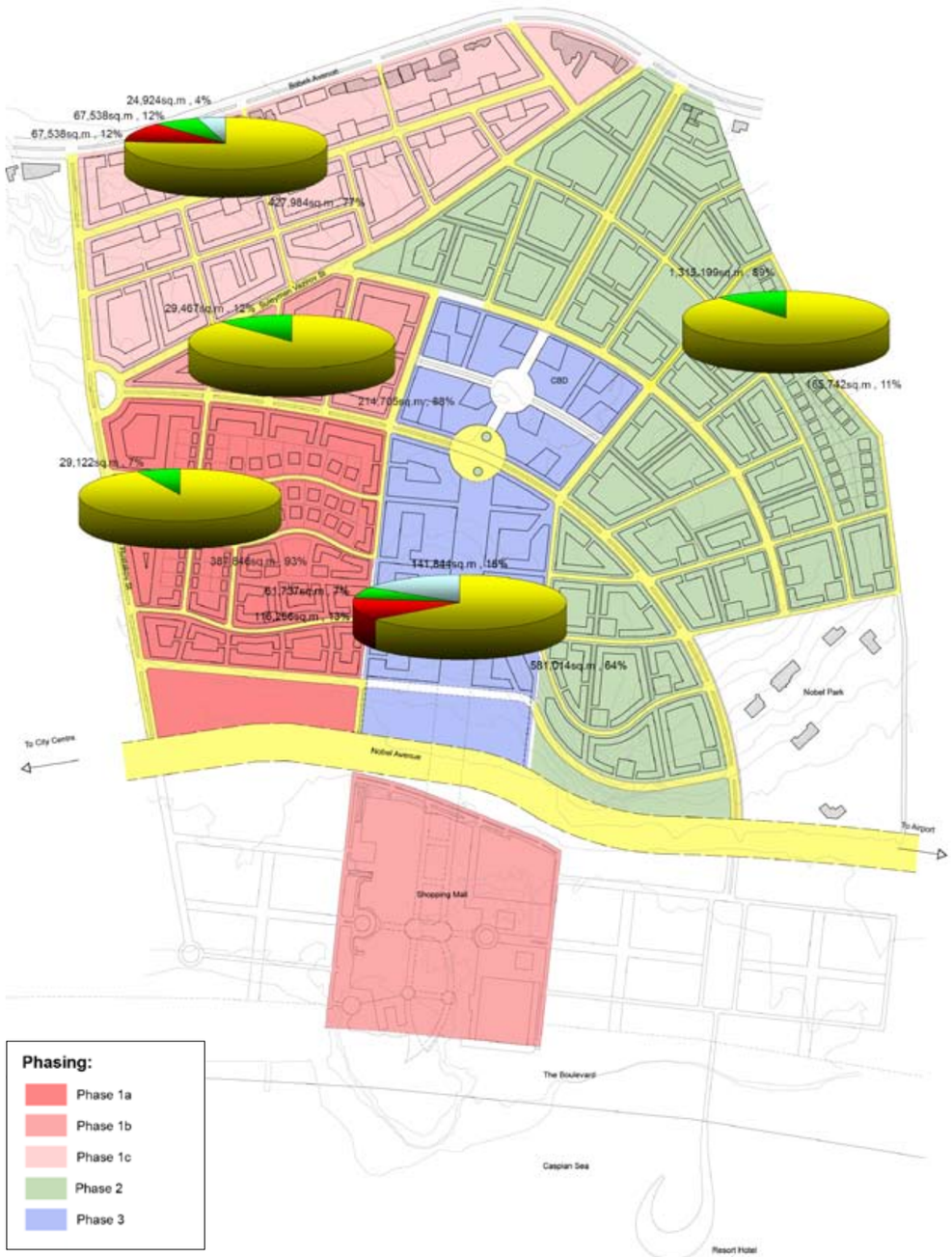


Figure 5.4 Floorspace by Development Phase



FLOORSPACE MIX BY PHASE

The development of the masterplan has been split into five initial phases of development which were agreed with the client during the August workshop in London.

Phases 1a, 1b and 1c (as illustrated on Figure 5.4) are located on the western side of the site adjoining Khagani Rustanov Street and between Suleyman Vazirov Street and Babek Avenue. This area is comparatively unconstrained and has the advantage of being close to existing infrastructure. Figure 5.4 also illustrates the estimated mix of floorspace by type within these phases. A mix of residential and commercial floorspace within the Garden District and the commercial showrooms along Babek Avenue will provide early revenue.

The second phase (shown in green on Figure 5.4) builds out the remainder of the Babek Quarter to the north and east of the Hub, together with the prestigious Nobel Heights residential neighbourhood. This area will require the resettlement of existing housing. The estimated mix of floorspace for this phase will largely comprise residential uses, with some flexible commercial space on ground floors.

The final phase (shown in blue on Figure 5.4) develops the Hub and the Central Gardens to the north of Nobel Avenue. The construction of the CBD depends on the timing of the future metro, with the underground station directly below the Central Plaza. The refurbishment of Nobel Park would also be completed in this phase. This phase will comprise a larger proportion of office and commercial floorspace than other phases, which will provide jobs and services for the established residential community.

Figure 5.5 Land Use Plan

LAND USE

Whilst the master plan should be flexible enough to take into account changes in market demand for various types of floorspace, it should not allow development to take place that would compromise the integrity, cohesiveness and general amenity of the master plan. Particular land uses, such as offices and retail, can create traffic issues that, if developed in the wrong location, will detrimentally affect the amenity of local residents. A land use framework has therefore been developed as part of the master plan, which prescribes the particular types of uses which would be suitable in each area, as illustrated in Figure 5.5

- It is expected that the large retail units would have a catchment area much wider than the master plan area and would therefore draw in traffic from throughout the city. These premises are therefore located on the northern edge of the site, offering good access to Babek Avenue, which is a major traffic artery in the city, and reducing the need for external traffic to enter the core master plan area.
- The CBD is sited towards the centre of the master plan area to take advantage of the excellent accessibility facilitated by the proposed metro station
- Ground floors throughout most of the northern section will accommodate flexible commercial floorspace which could include convenience retail, community facilities, and other local services. The location of these facilities within residential areas will ensure that they are easy to reach for the local population
- The principal areas of high and medium density housing should be closely related to the CBD for reasons of accessibility and sustainability.
- The buildings within the Central Gardens will include a mix of uses on ground floors, including civic buildings and larger community facilities, taking advantage of what will be a highly accessible and visible location within the master plan.
- Mixed use development, which includes a high proportion of leisure and retail units on ground floors, will be located on blocks which front onto the sea front boulevard in order to maximise the interface between the development and the improved public realm within the boulevard.

Whilst Figure 5.5 illustrates the broad land use framework for the master plan, further detail on the scale and mix of development will be required when developing a more detailed vision for each character area. Development guidelines, which set out the parameters for height, bulk, massing, set back and land use will be required for each land parcel at a later date.

DEVELOPMENT DENSITY

The master plan has been deliberately developed at a relatively high density in order to create a compact urban area that utilises the existing developable area in the most efficient way possible. The relatively high density also allows a range of public transport modes to be supported and creates an environment where a range of uses can be located within close proximity to each other, thereby creating a vibrant urban area and a reduction in the need to travel.

There are two key measures of the density of development:

- The Floorspace Area Ratio (FAR) which measures the total amount of gross floorspace accommodated on a particular area or plot.
- Dwellings per ha (dph) which specifically looks at the total amount of residential units within a defined area

Floorspace Area Ratio

It is estimated that the FAR for the entire northern section of the master plan (the total amount of gross floorspace that will be developed divided by the total area of the development) will be around 2.7. This is comparable to a relatively dense urban area of a European city such as Paris or Barcelona.

The density of development will vary in each of the Character Areas as a result of the variation in building heights, mix of uses and provision of open space. Table 5.1 demonstrates the FAR by Character Area.

Table 5.1 FAR by Character Area

	TOTAL AREA	TOTAL DEVELOPMENT (GROSS)	FAR
Babek Avenue	146,673	245,358	1.7
Babek Quarter	506,913	1,308,526	2.6
CBD	97,735	406,955	4.2
Garden District	205,466	416,968	2.0
Central Gardens	123,042	493,896	4.0
Nobel Heights	262,348	733,773	2.8
Total	**1,342,177**	**3,605,476**	**2.7**

Dwellings per hectare

The average number of dwellings per hectare is 124. Again, this is comparable to relatively high density residential areas such as in Bloomsbury, Inner London. The density of dwellings, shown in Table 5.2 below, varies between Character Area as a result of the mix of other non-residential uses and provision of non-developable uses such as open space.

Table 5.2 Dwellings per hectare

	TOTAL AREA (HA)	DWELLINGS	DWELLINGS PER HECTARE
Babek Avenue	14.7	886	60.4
Babek Quarter	50.7	6666	131.5
CBD	9.8	868	88.8
Garden District	20.5	2083	101.4
Central Gardens	12.3	2521	204.9
Nobel Heights	26.2	3659	139.5
Total	**134.2**	**16,683.4**	**124.3**

Developable Area Analysis

In addition to the analysis of density above, we have also considered the density of development solely on land that is considered 'developable'. The advantage of this type of analysis is that land that cannot be sold to developers is removed from the calculation, therefore providing a more accurate representation of the level of density recommended on plots that be sold. The developable area within the master plan is therefore defined as the area which could be can sold to prospective developers for residential, commercial and retail uses, including parking courtyards, private gardens and other uses ancillary to development. Major roads and public open spaces are usually not considered to be part of the developable area.

It is estimated that there is a total of 109ha of developable land (81% of the total area) within the northern section of the master plan. Using this figure, there is an estimated total of 33,000sq.m of gross floorspace per developable ha throughout the northern section of the master plan. Table 5.3 shows the estimated level of gross floorspace per developable hectare within each Character Area.

Table 5.3 Gross Floorspace per Developable Area

CHARACTER AREA	TOTAL DEVELOPABLE AREA (SQ.M)	GROSS FLOORSPACE PER DEVELOPABLE AREA
Babek Avenue	91,102	26,932
Babek Quarter	426,096	30,710
CBD	80,877	50,318
Garden District	190,069	21,938
Central Gardens	90,208	54,751
Nobel Heights	214,139	34,266
Total	**1,092,491**	**33,002**

RESIDENT POPULATION AND WORK FORCE

Residential Population

As part of the sustainability principles central to the development of the master plan, Black City should strive to accommodate a socially diverse community. A socially diverse community is one that can offer accommodation and support a wide range of people. A key goal of the development is therefore to create a truly mixed community that houses people of different ages, backgrounds, lifestyles and economic status.

Due to the relatively high density of development throughout the master plan, the majority of dwelling units are expected to be apartments, although provision for around 70 villas has also been taken into account. The relatively high proportion of apartments provided in the master plan is to satisfy current market demand in Baku, where apartment-living is common. There will be a wide range of apartment sizes and types, which will appeal to a wide variety of the market. It is expected that apartments will range from 1 bedroom studio apartments, to apartments with 4+ bedrooms.

Although the exact mix of apartment sizes eventually developed in the master plan area will depend upon market conditions, we have made assumptions based upon the average size and mix of dwelling types in order to estimate the overall number of units that could be provided in the development.

The assumptions used in these estimates are illustrated below:

- 1 bedroom studio apartments – Average size: 80sq.m – 5% of total units
- 2 bedroom – Average size: 100sq.m – 25% of total units
- 3 bedroom – Average size: 120sq.m – 40% of total units
- 4 bedroom – Average size: 160sq.m – 30% of total units

In order to estimate the residential population that could be accommodated, we have applied the estimated number of residential units to an estimated average household size for each unit size. The average household size applied is illustrated below:

- 1 bedroom studio apartments – 1.5 people
- 2 bedroom – 2.5 people
- 3 bedroom – 3.5 people
- 4 bedroom – 4.5 people

Figure 5.6 and Table 5.4 demonstrate the estimated number of residential units, alongside the estimated population. In total, it is estimated that the northern section may be able to accommodate up to 55,000 people.

Table 5.4 Estimated Population and Dwellings by Character Area

	UNITS	POPULATION
Babek Avenue	526	1,724
Babek Quarter	7,762	25,463
CBD	868	2,844
Garden District	2,088	6,891
Central Gardens	2,521	8,256
Nobel Heights	2,930	9,596
Total	**16,695**	**54,774**

Workforce

Attracting employment uses to the development will offer opportunities for residents to live in close proximity to their place of work, thereby reducing the need to travel. It is important that the master plan offers sufficient employment to reduce the number of people commuting out of the development every day, but does not offer an excessive amount that will create incoming traffic and amenity issues for residents of Black City.

In order to derive an estimate of the total number of jobs that could be supported within the master plan, we have applied typical employment densities (the amount of gross floorspace required to support one employee) to the estimates of floorspace that will support employment. The employment densities used are illustrated below:

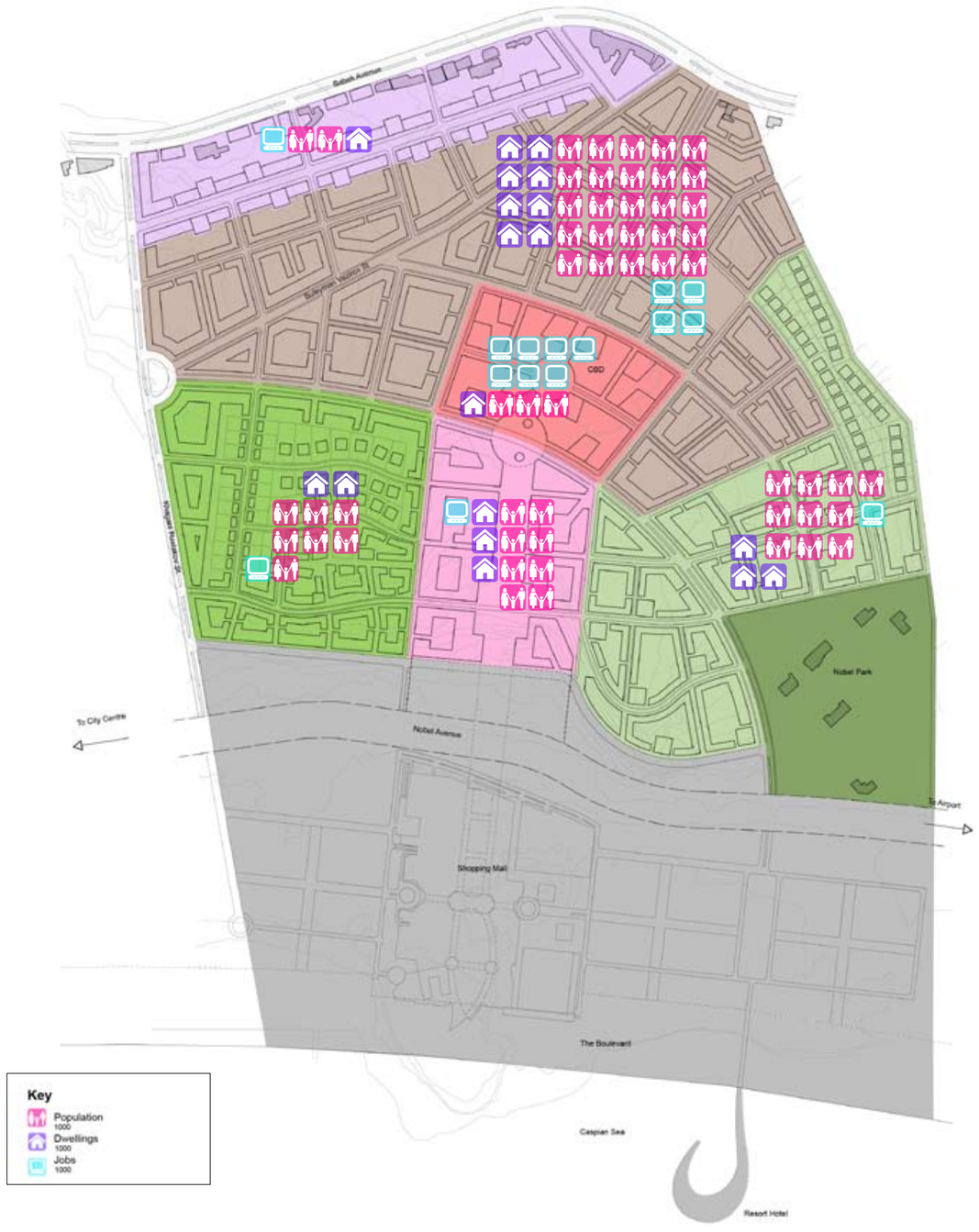
- Comparison Floorspace – 40sq.m per person
- Flexible Commerical Floorspace – 50sq.m per person
- Office Floorspace – 20sq.m per person

Table 5.5 illustrates the total estimated amount of employment that could be supported in the northern section of the master plan by Character Area and by sector. Figure 5.6 illustrates the total amount of employment by Character Area.

Table 5.5 Estimated Employment per Sector

	COMPARISON RETAIL	CONVENIENCE RETAIL	OFFICE	TOTAL
Babek Avenue	718	0	503	1221
Babek Quarter	464	2,909	369	3,743
CBD	2,034	-	4,965	6,999
Garden District	-	454	-	454
Central Gardens	-	988	-	988
Nobel Heights	-	890	-	890
Total	**3,216**	**5,241**	**5,837**	**14,294**

Figure 5.6 Population, Units and Employment



SOCIAL AND COMMUNITY INFRASTRUCTURE

It is recommended that a full range of community facilities should be provided throughout the development to support the needs of the emerging neighbourhood. Community facilities should be viewed as an integral part of the development; the rationale for making such provision is as follows:

- A mix of services and facilities is required to create a liveable community; this is partly how the success of the development will be measured;
- The site is not well served by existing facilities. There are no shops and services within easy walk or drive of the site;
- The target population is of a scale sufficient to provide the threshold number of people needed to make the provision of a wide range of facilities economically viable;
- Future residential occupiers will expect to be within easy access of a full range of community facilities including shops, cafes, mosques, schools, health and recreational facilities;
- The provision of local facilities, especially schools and open space, is necessary to attract higher income Azeri households and to encourage residents to use their property as their permanent residence;
- Greenspace and recreation facilities support the lifestyle concept of a 'new way of living'. They are needed to create the right feel and atmosphere which can justify the premium prices paid for residential units which front onto open space and water;
- Local provision of facilities is sustainable and will internalise trips, meeting some day to day needs within each development component.

Approach to Community Facilities Planning

SNIP code 2.07.01-89 provides general planning, zoning and development guidance within Azerbaijan. Although the guidance does not recommend the quantity of facilities that should support a residential community, it does provide guidance on typical access standards for community facilities, as illustrated below.

Table 5.6 SNIP Code Accessibility Standards

FACILITY	RECOMMENDED ACCESS (M)
Pre-school institutions	300
General education schools	750
Elementary schools	500
Spaces for physical culture and health	500
Sports centres	1500
Hospitals and clinics	1000
Pharmacies	500
Local retail	500
Post offices and banks	500

We consider that the recommended access levels illustrated above broadly represent good practice in providing facilities that are within close proximity to residential areas.

We recommend an approach where the Central Gardens will act as the main service centre for the development, accommodating a wide range of large community facilities such as secondary schools, civic buildings and health facilities. The rational behind locating major facilities at the Central Gardens is that the Character Area forms the spine of the development and is easily accessible from the rest of the master plan (as illustrated by figure 5.7). The area also benefits from good accessibility from the metro station at its northern tip as well as from the proposed tram along the waterfront.

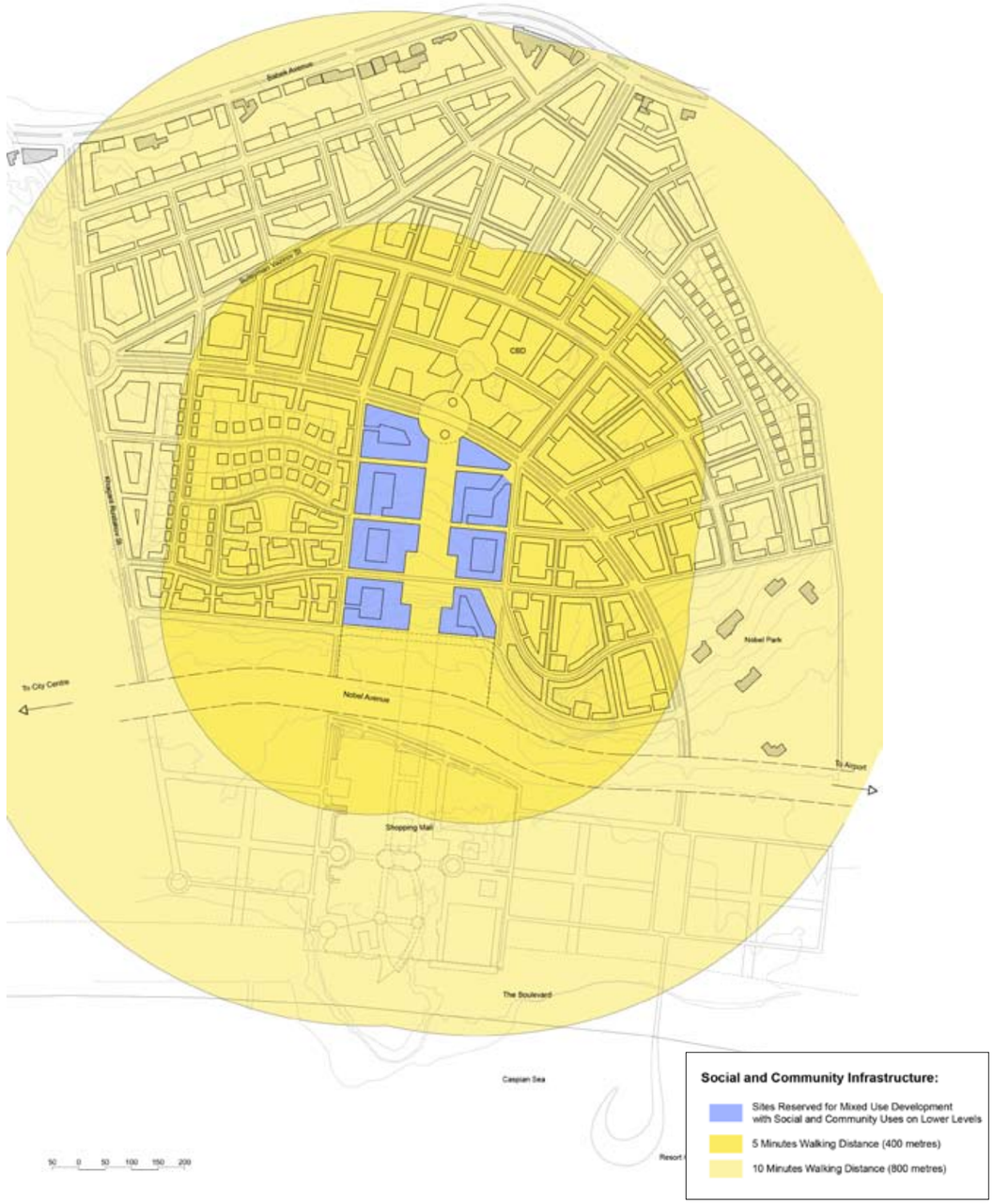
Residential areas will accommodate other local facilities, such as primary schools and local convenience retail facilities, which are no further than 400m (5 minutes walk) from any residential building. The concept is that facilities will be provided as close as is possible to homes and workplaces whilst maintaining efficiency in service delivery by providing a sufficient population to underpin viability.

The initial approach to the range of services to be provided is set out in Table 5.7. along with the distribution of provision within the site

Table 5.7 Hierarchy of Community Infrastructure

HIERARCHY LEVEL	FACILITY TYPE	NO. AND POTENTIAL LOCATIONS
District (Serving whole development within 10-15 min walking distance)	Municipality buildings	Central Gardens
	Sports complex	Central Gardens
	Further Education College	Central Gardens
	Secondary school	2 located on Central Gardens
	Polyclinic/Hospital	The CBD
	District shopping areas	Waterfront shopping centre and CBD
	Cinema	CBD/Waterfront
	Cultural complex	Waterfront
	Library	Central Gardens
	Police, Fire Station, Civil Defence	Babek Avenue
Neighbourhood (Serving development within 5-10 min walking distance)	Elementary schools	6 At least 1 per neighbourhood
	Primary Schools	4 - 1 per neighbourhood
	Local Health centre	4 – 1 per neighbourhood
	Local shopping centre	Scale to be confirmed
	Place of worship	
Local (Serving individual development clusters within 5 min walking distance)	Local shop	
	Childrens play area /local open space	
	Kindergarten	

Figure 5.7 Social and Community Infrastructure



6. MOVEMENT FRAMEWORK

EXISTING CONDITIONS

Access and Road Network

There are three main access roads to the site as follows:

- Babek Avenue to the north;
- Nobel Avenue to the south; and
- Khagani Rustakov Street to the west.

In addition, there are a number of service roads within the site which serve the factories.

Nobel Avenue

Nobel Avenue is the main access road for the southern section of the site. It runs east-west carrying traffic between the city centre and areas to the east, including Heydar Aliyev International Airport. Nobel Avenue is still under construction, and when completed, will be a dual carriageway with four lanes in each direction. Site observations have shown that Nobel Avenue carries the largest traffic volumes during the peak periods.

Babek Avenue

Babek Avenue is the main east-west access road for the northern section of the site. Similar to Nobel Avenue, it carries traffic between the city centre and areas to the east. It is a dual carriageway with three lanes in each direction. Car showrooms are sited along Babek Avenue at the site perimeter and it is understood that the road tends to be busier at weekends.

Khagani Rustakov Street

Khagani Rustakov Street is a single carriageway road and forms the north-south access road to the western section of the site. Khagani Rustakov Street is currently connected to Nobel Avenue at the southwest corner of the site.

Service Roads

There are several small service roads within the site, many of which are in poor condition. The pavement material varies from tarmac and concrete to small gravel tracks. All three types are sometimes prominent on one road.

Public Transport

Buses

Baku has two principal forms of public transport; Metro and buses. The buses offer cheap, flat fares, but it is understood that they suffer from poor operational standards. They are mostly operated by private companies who receive licences from the government to run the services, but it is not known what standards (if any) the government applies or what control it exerts over the network or frequency. The vehicles themselves are a mixture of former government controlled buses and medium sized vans.

Bus stops are prominent in the city, although many passengers flag down and stop buses at any location so that buses make frequent kerbside stops.

Metro

The Baku Metro is a rapid transit system composed of two lines, which meet near Baku's central railway station Line One is 20.1km in length with 13 stations, while Line Two is 11.4km in length with seven stations.

Line Two is currently being extended northwards, with two stations under construction and a third one planned. There is also a plan to extend the same line eastwards with four new stations. A third line heading south from Nizami station is being studied.

The Baku Metro operates between 6am and 1am, with trains every 2.5 minutes during peak hours (with a possible headway of 90 seconds), and every 5-15 minutes during the rest of the day. In 2003, the system carried a total of 0.4 million people daily.

DEVELOPMENT TRIP GENERATION

Vehicular Trip Generation

As requested by ADEC at the workshop held in London on 18th July 2008, vehicular trip rates have been derived from the US 'Trip Generation' (7th Edition, 2004) by the Institute of Transportation Engineers (ITE). The trip rates are listed as average vehicular trip rates for adjacent street traffic for the busiest hour within the following time periods:

- 0700 – 0900 hours; and
- 1600 – 1800 hours.

Since the trip rates are for the busiest hour within each peak, it is likely that the peak hours for different land uses would occur at different times within each peak period. However, in order to provide a more robust assessment, it has been assumed that the peak hour for each land use coincides to represent a worst case scenario. As advised by the Atkins Masterplanning team, all convenience retail trips have been discounted as internal trips. All other land use trip rates have been reduced by 30% to account for internalised trips. It has been assumed that the majority of these internal trips would be made on foot.

Development Trips and Modal Split

The CBD, Waterfront and Shopping Mall

As outlined previously, a new Metro station will be constructed in the CBD development zone. This development zone will also be a focus for bus services and thus is anticipated to have a high level of public transport use (40% assumed).

The Shopping Mall will also be a focus for bus services, while a tram will be constructed along the Caspian Sea waterfront, so that along with the Waterfront development zones, this development zone is anticipated to have a high level of public transport use (40% assumed).

Babek Avenue Strip and Garden District

It has been assumed that the mode share for public transport will be lower for the Babek Avenue Strip and Garden District development zones (30%). This is because a significant amount of residential development is planned for these zones, while they are located furthest from the public transport hubs. The comparison retail within the Babek Avenue Strip development zone is planned to be freestanding stores, which will have a higher proportion of private vehicle trips.

Nobel Heights

A public transport share of 25% is assumed for the Nobel Heights development zone due to the distance from the public transport nuclei in the CBD and Shopping Mall development zones.

Vehicular Trips

Table 6.1 below shows the resulting peak hour vehicular trips for each development zone.

Table 6.1 - Peak Hour Vehicular Trips by Development Zone

DEVELOPMENT ZONE	AM PEAK HOUR		PM PEAK HOUR	
	ARRIVALS	DEPARTURES	ARRIVALS	DEPARTURES
Babek Avenue Strip	293	205	775	806
Babek Quarter	609	1767	2117	1400
CBD	965	405	914	1397
Garden District	545	667	680	682
Central Gardens	533	639	651	663
Nobel Heights	509	836	842	703
Waterfront West	229	483	482	350
Shopping Mall	907	322	1224	1689
Waterfront East	415	786	889	701
Total	**5004**	**6111**	**8576**	**8390**

Table 6.1 above shows a higher number of departures compared to arrivals during the AM peak hour, with a higher number of arrivals compared to departures during the PM peak hour. This is due to the scale of residential development associated with the project, which has higher departure trip rates than arrival trip rates during the AM peak hour, with the pattern reversed during the PM peak hour.

The PM peak hour generates higher flows than the AM peak hour due to the presence and scale of the comparison retail land use, which has higher trip rates during the PM peak hour than the AM peak hour.

Public Transport trips are shown in Table 6.2 below.

Table 6.2- Peak Hour Public Transport Trips by Development Zone

DEVELOPMENT ZONE	METRO				BUS			
	AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR	
	ARRIVALS	DEPARTURES	ARRIVALS	DEPARTURES	ARRIVALS	DEPARTURES	ARRIVALS	DEPARTURES
Babek Avenue Strip	105	73	277	288	21	15	55	58
Babek Quarter	217	631	756	500	43	126	151	100
The CBD	563	236	533	815	80	34	76	116
Garden District	195	238	243	244	39	48	49	49
Central Gardens	311	373	380	386	44	53	54	55
Nobel Heights	136	223	224	188	34	56	56	47
Waterfront West	38	80	80	58	114	241	241	175
Shopping Mall	151	54	204	281	454	161	612	844
Waterfront East	69	131	148	117	207	393	445	350
Total	**1785**	**2040**	**2846**	**2877**	**1037**	**1127**	**1740**	**1794**

TRIP DISTRIBUTION

Trip Distribution Stage 1

Firstly, two external zones were designated as follows:

- West (Baku city centre direction); and
- East (Heydar Aliyev International Airport direction).

The trips have been distributed between these two external zones based on the following assumptions:

- 70% of all external traffic associated with the development will arrive from / depart to the western external zone;
- 30% of all external traffic associated with the development will arrive from / depart to the eastern external zone.

The majority of trips are expected to arrive from / depart to the west because Baku city centre and the majority of the population are located to the west of the development.

Trip Distribution Stage 2

The next stage of the trip distribution process has assigned trips to either Babek Avenue or Nobel Avenue, so that combined with the first stage of the trip distribution process, there are four arrival / departure points as follows:

- Babek Avenue West;
- Babek Avenue East;
- Nobel Avenue West; and
- Nobel Avenue East.

For most of the development zones, trips have been assigned to Babek Avenue or Nobel Avenue on the assumption that 90% would be able to choose the approach road closest to their destination development zone (for example 90% of traffic associated with Babek Avenue Strip would use Babek Avenue). The remaining 10% would be forced to use the approach road furthest from their destination development zone as they would be travelling from areas too close to the development to be able to make a decision.

There are two exceptions to this assumption. Due to its location in the centre of the development, trips associated with the Hub have been distributed equally (i.e. 50:50) between Babek Avenue and Nobel Avenue. For the development zone, 80% of trips have been assigned to Babek Avenue, with the remaining 20% assigned to Nobel Avenue, due to its location between the centre and north of the development.

Trip Distribution Stage 3

Fifteen junctions have been identified along the main highways bordering the development (Babek Avenue, Nobel Avenue and Khagani Rustakov Street).

Traffic may enter the development from all junctions with the exception of junction 5, which is the intersection between Babek Avenue and Khagani Rustakov Street only.

Trips have been distributed according to a combination of the following:

- Distance between the arrival / departure points and access junctions; and
- The area of development served by each access junction.

The resulting distribution for each development zone is shown in Figures 6.1 to 6.9 below

Figure 6.1 Babek Avenue Strip Distribution

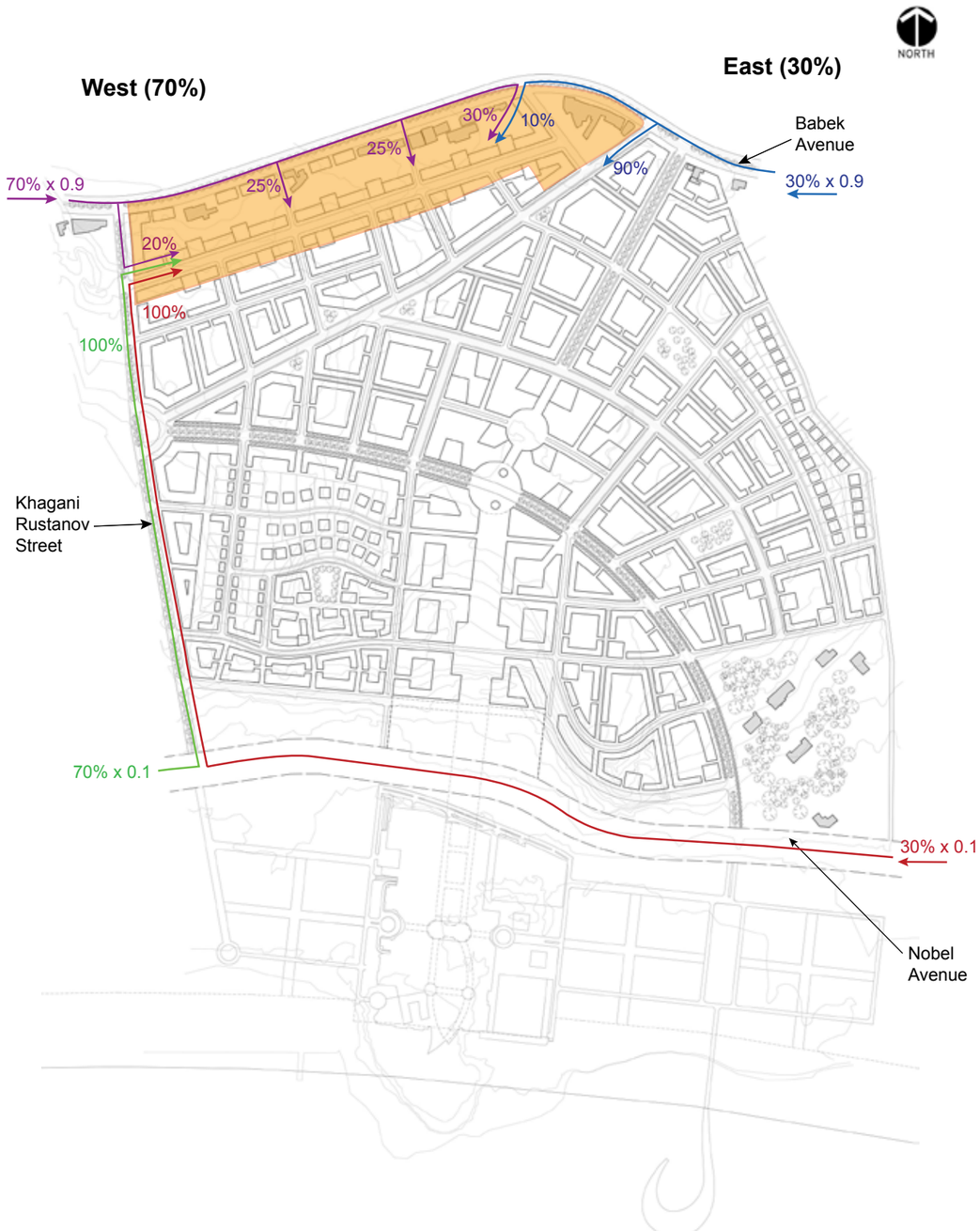


Figure 6.2 Babek Quarter Distribution

Figure 6.3 The CBD Distribution

Figure 6.4 Garden District Distribution

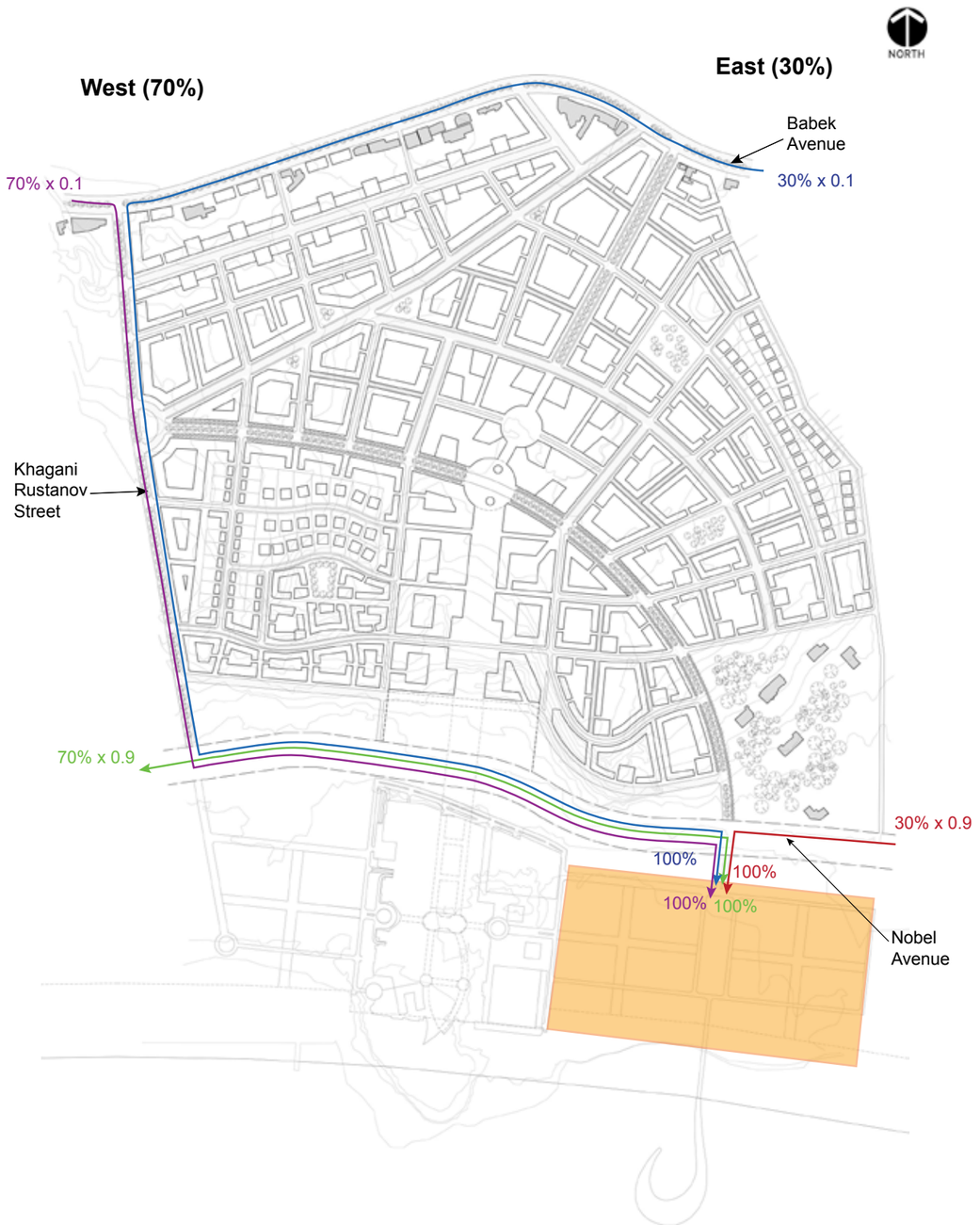
Figure 6.5 Central Gardens Distribution

Figure 6.6 Nobel Heights Distribution

Figure 6.7 Waterfront West Distribution

Figure 6.8 Shopping Mall Distribution

Figure 6.9 Waterfront East Distribution



TRANSPORT IMPACTS AND PHASING

Traffic Flows

The development traffic flows for the AM and PM peak hours are shown in Figure 6.10 and 6.11 respectively.

Traffic surveys were undertaken along Babek Avenue and Nobel Avenue for the AM Peak Hour in July / August 2008. It should be noted that the surveys were undertaken during the school holidays due to the short project timescale. The traffic flows along Babek Avenue and Nobel Avenue are shown in Figure 6.12 and 6.13 for the AM and PM peak hours respectively (tidal flows have been assumed – i.e. the AM peak hour flows have been reversed to produce PM peak hour flows).

Due to a lack of any traffic growth information guidance from the local highway authority, the 2008 traffic flows have been increased by 20% to represent flows in the opening year (2018) and to take into account increased flows during school term times.

Traffic Impact Summary

It is estimated that approximately 17,000 trips will be generated by this development proposal during the AM peak hour, with approximately 26,000 in the PM peak hour. This constitutes approximately 11,000 and 17,000 private vehicle trips respectively, with the remaining trips made by bus and metro.

The quantum of development proposed is more than three times the amount of existing vehicular trips on the highway network. Thus, it has been suggested by the local highway authority that widening of the main two arterial roads will benefit the project. The following sections of this report will identify the possible highway and sustainable travel improvements required during each phase of the development to accommodate the large volume of additional traffic.

Figure 6.10 AM Peak Hour Development Traffic Flows

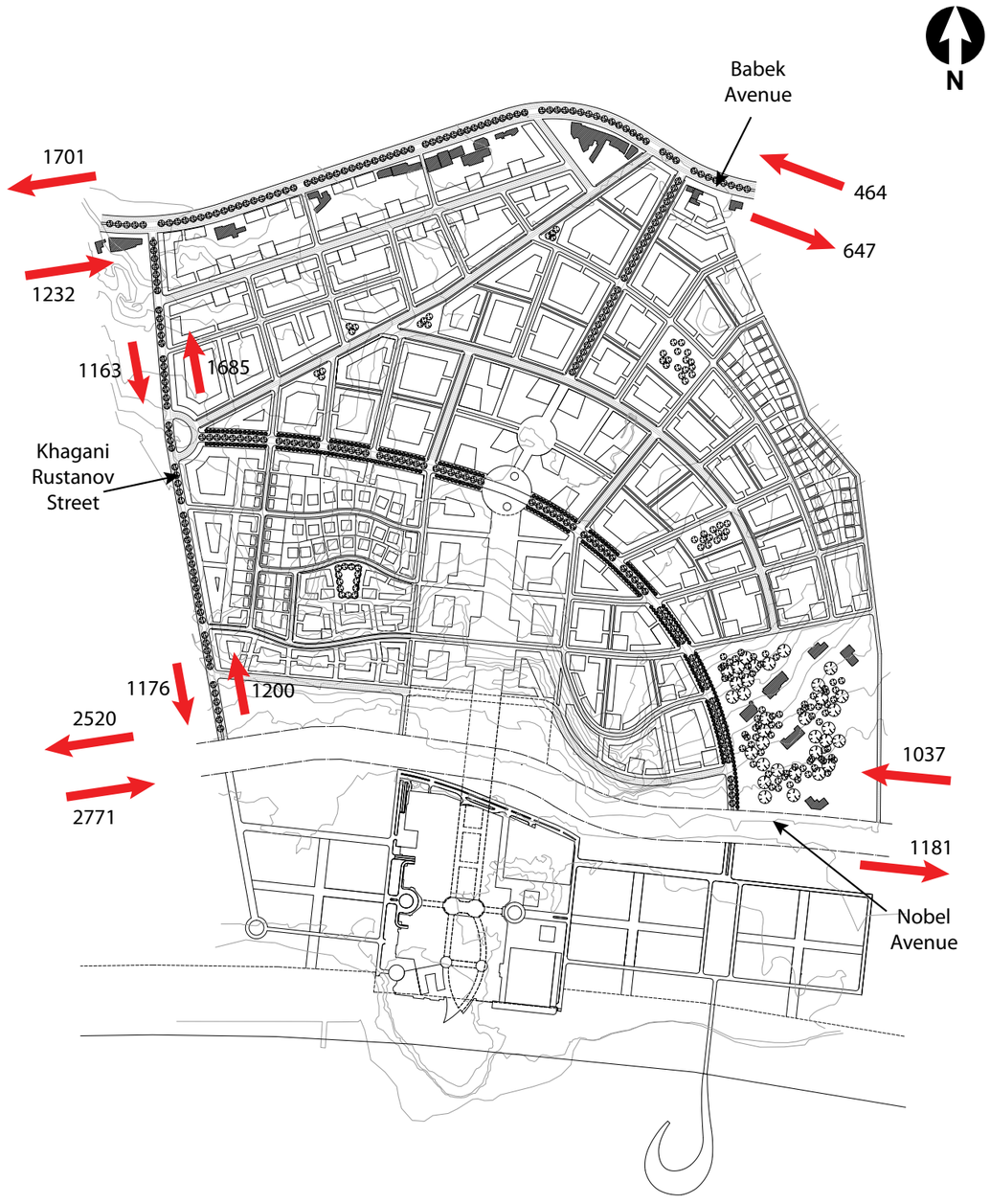


Figure 6.11 PM Peak Hour Development Traffic Flows

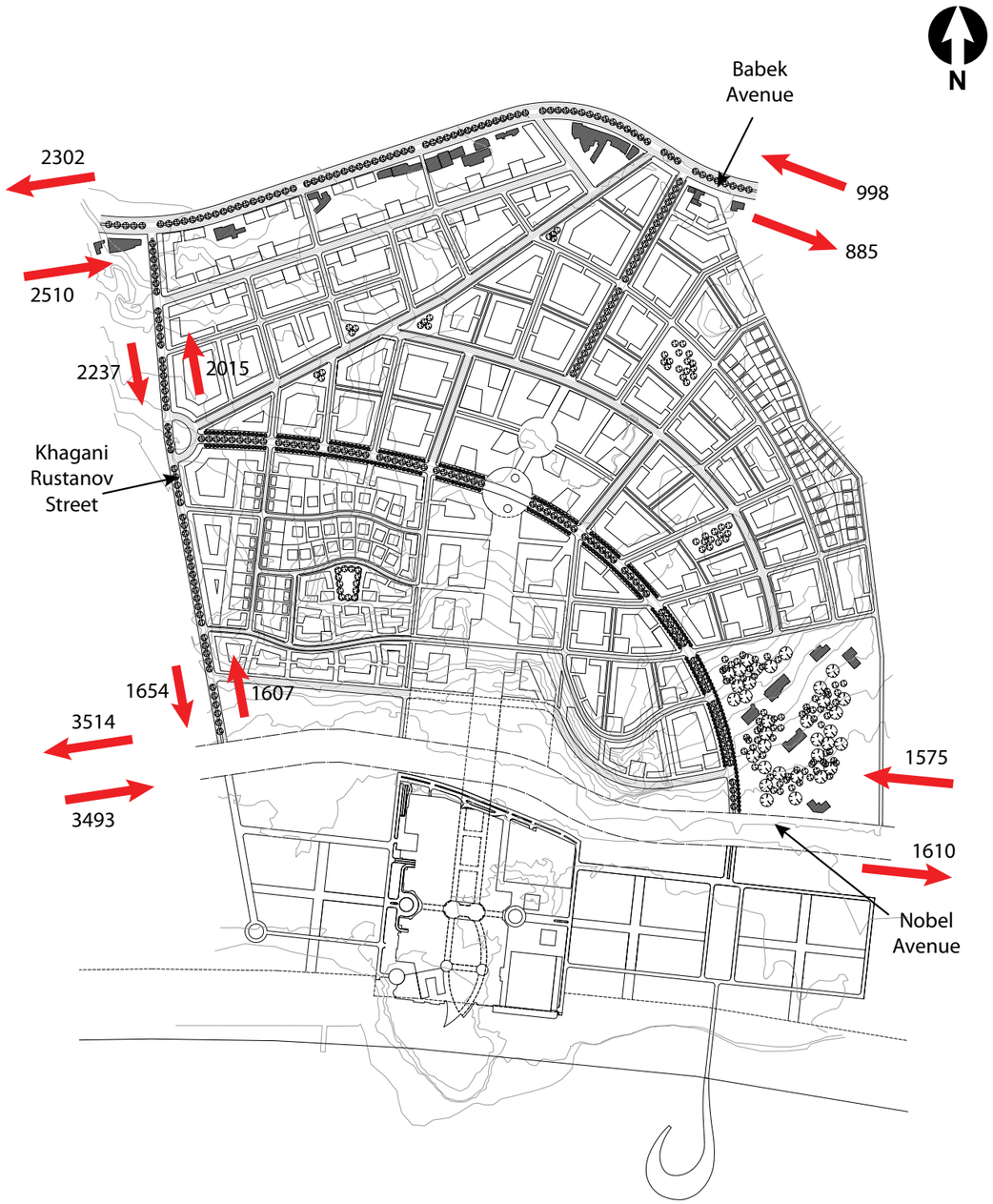


Figure 6.12 AM Peak Hour Traffic Flows - Babek Avenue and Nobel Avenue (2008)

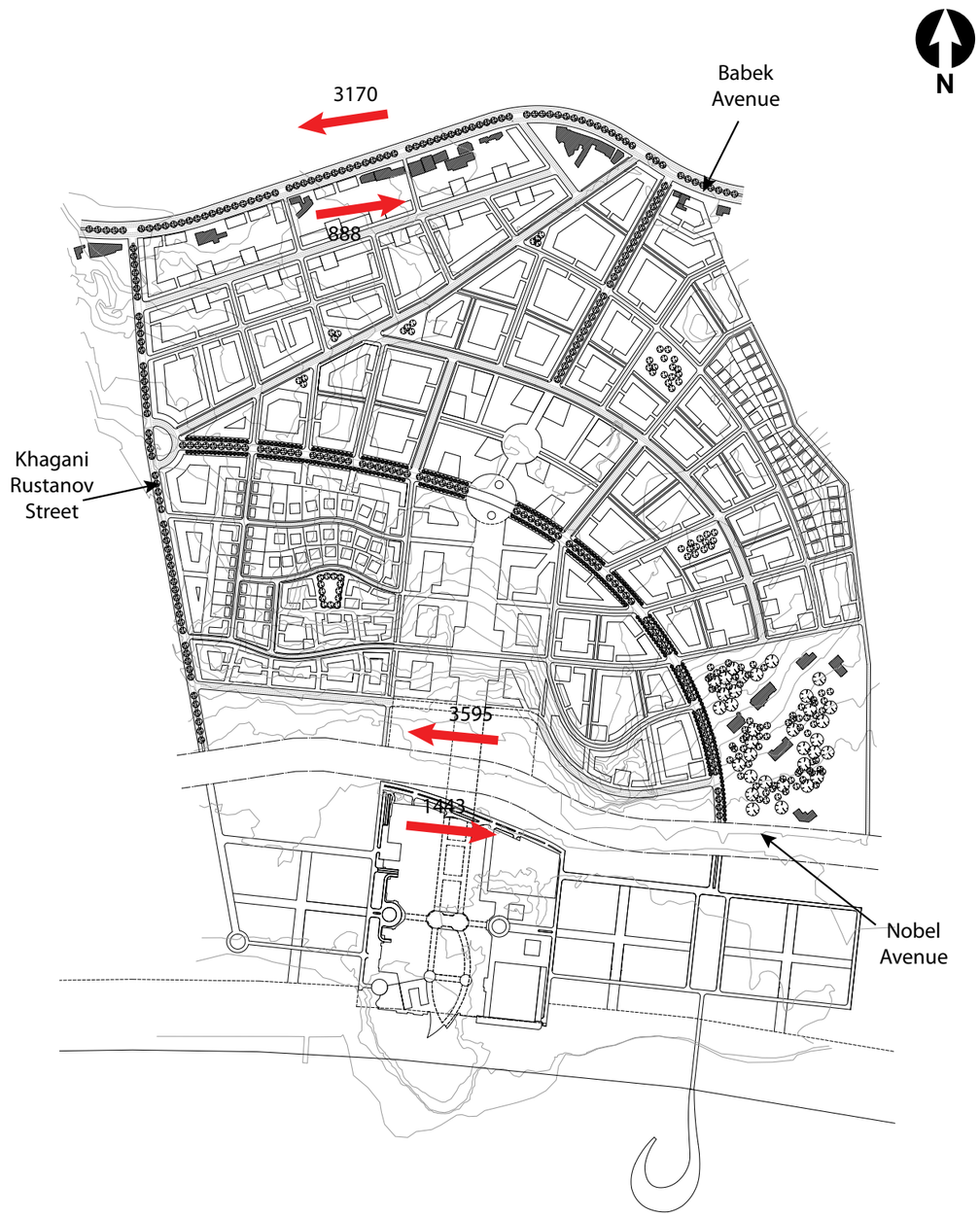
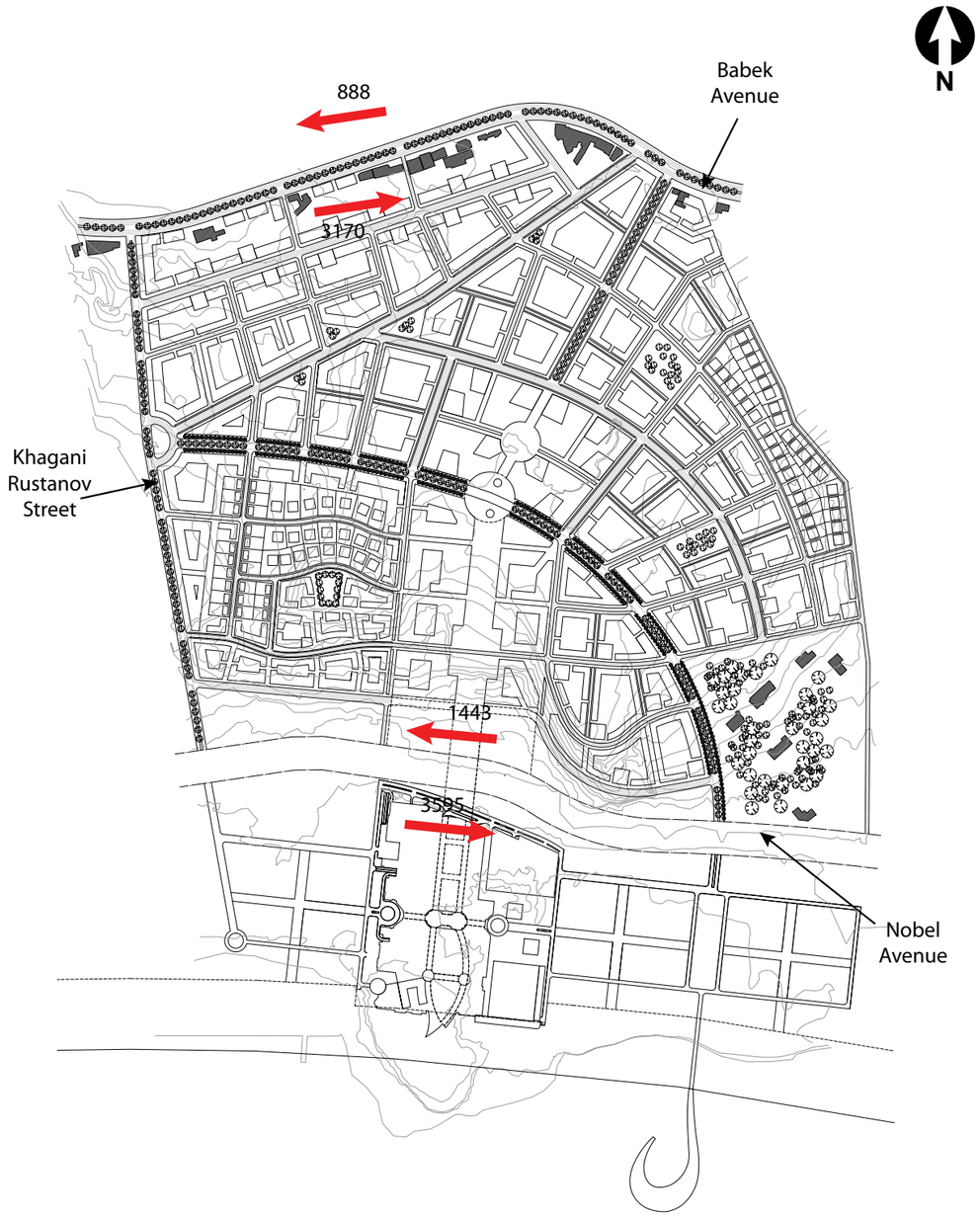


Figure 6.13 PM Peak Hour Traffic Flows- Babek Avenue and Nobel Avenue (2008)



The Scope of Highways Improvement

This section sets out the scope of highways improvements required to accommodate the various phases of the development. They are shown in Figure 6.14 to 6.19. A plan illustrating the location of each phase is provided in Figure 5.4.

Phase 1A (Refer to Figure 6.14)

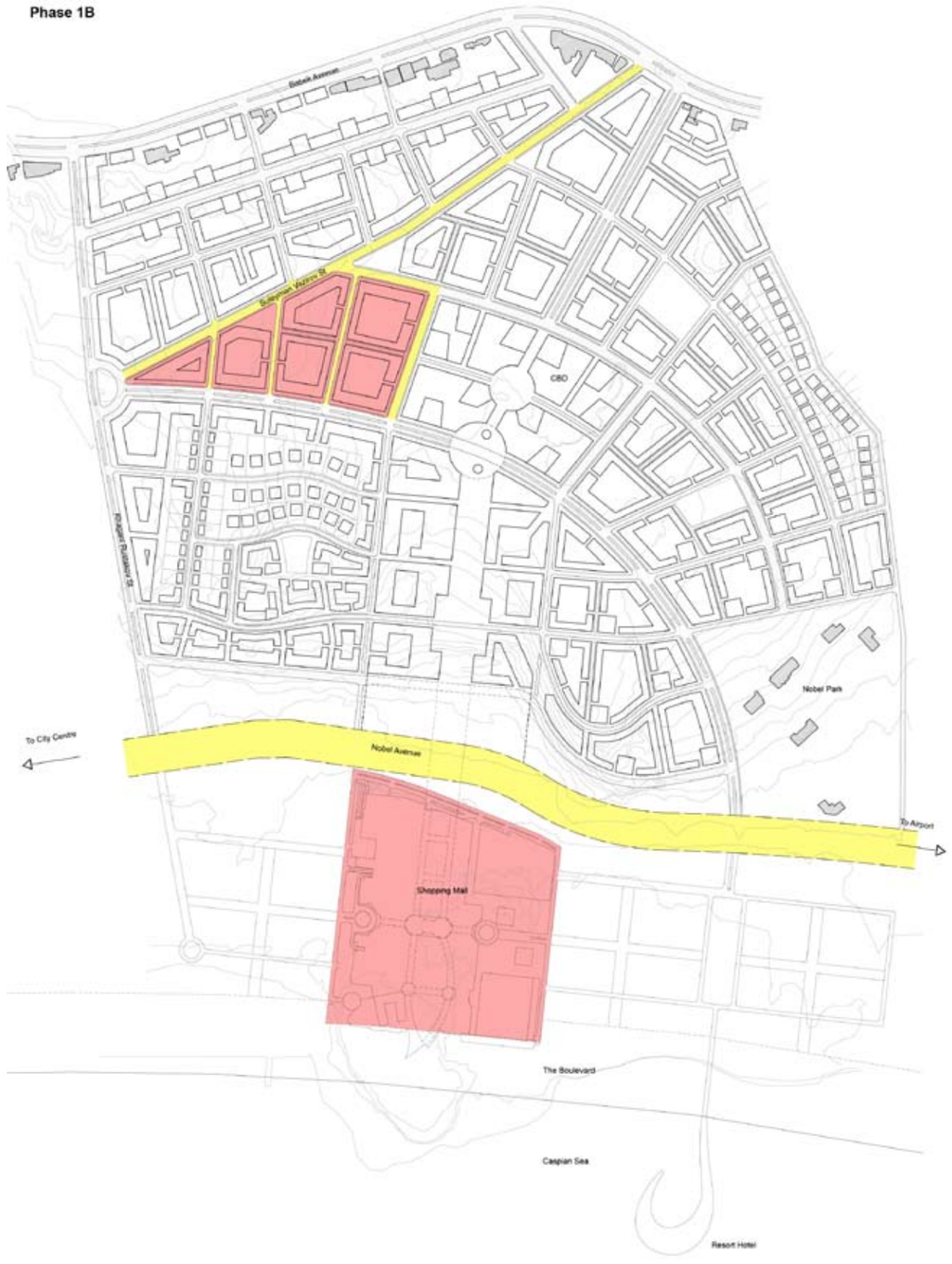
- The turning movements at the junction between Nobel Avenue and Khagani Rustakov Street are currently limited. This junction will need to be improved to provide full turning movements and improve access from Nobel Avenue (and the city centre) to Phase 1A of the development site.
- Khagani Rustakov Street is currently in poor condition and the section between the Nobel Avenue and Central Avenue junctions will need to be upgraded to provide improved access from Nobel Avenue to Phase 1A of the development site.
- New access points will need to be provided from the east side of Khagani Rustakov Street. This would disperse vehicular traffic across several openings into Phase 1A of the development site, and reduce the likelihood of congestion along Khagani Rustakov Street.
- The first phase of Central Avenue will need to be completed between Khagani Rustakov Street and the CBD development zone to enable access from the north side of Phase 1A of the development site.
- A bus network will need to be initiated to serve Phase 1A of the development.

Figure 6.14 Phase 1A

Phase 1B (Refer to Figure 6.15)

- The junction between Khagani Rustakov Street and Central Avenue will need to be enlarged to cater for the extra traffic that will use this junction to access Phase 1B of the development site.
- Suleyman Vazirov Street is currently in poor condition and will need to be improved to provide improved access to Phase 1A and 1B of the development site.
- The junction between Babek Avenue and Suleyman Vazirov Street will need to be improved to provide improved access to Phase 1A and 1B of the development site from Babek Avenue. Full turning movements will be provided at this junction.
- The bus network will need to be expanded to serve Phase 1B of the development site.

Figure 6.15 Phase 1B



Phase 1C (Refer to Figure 6.16)

- Khagani Rustakov Street will need to be extended northwards from Central Avenue to Babek Avenue to provide an additional access from Babek Avenue, thus improving access to Phases 1A, 1B and 1C of the development site.
- Improved access points will need to be provided from Babek Avenue into the development, thus dispersing traffic across several accesses into Phase 1A of the development site, and reducing the likelihood of congestion through one access point.
- Improvements to the key junction between Babek Avenue and Suleyman Vazirov Street will continue in order to provide improved access to Phase 1A, 1B and 1C of the development site from Babek Avenue.
- The bus network will need to be expanded further to serve Phase 1C of the development site.

Figure 6.16 Phase 1C

Phase 2A (Refer to Figure 6.17)

- The construction of Central Avenue will need to be completed between the CBD development zone and Nobel Avenue, thus providing improved access to the Nobel Heights and Garden City North development zones.
- A new junction will need to be provided between Nobel Avenue and Central Avenue.
- The bus network will need to be expanded to serve Phase 2A of the development site.

Figure 6.17 Phase 2A

Phase 2B (Refer to Figure 6.18)

- Construction of the main junction between Babek Avenue and Suleyman Vazirov Street will need to be completed to improve access to the development site from Babek Avenue.
- A new Metro station will need to be constructed in the CBD and linked in to the existing Baku Metro network to improve public transport access to the site from outside the development.
- The bus network will need to be expanded further to serve the new Metro station and Phase 2B of the development site.

Figure 6.18 Phase 2B

Phase 3 (Refer to Figure 6.19)

- The Metro station will need to be fully operational to serve the CBD and is fundamental to completion of this phase.
- The main junctions on Nobel Avenue will need to be completed along with key roads into the development adjacent to the Shopping Mall, thus improving access to Phase 3 from Nobel Avenue.
- A tram will need to be provided running along the Caspian Sea waterfront, thus linking the Shopping Mall and Waterfront West / East development zones.
- Bus services will need to be intensified to provide increased capacity for Phase 3 of the development site.

Figure 6.19 Phase 3

Shopping Mall

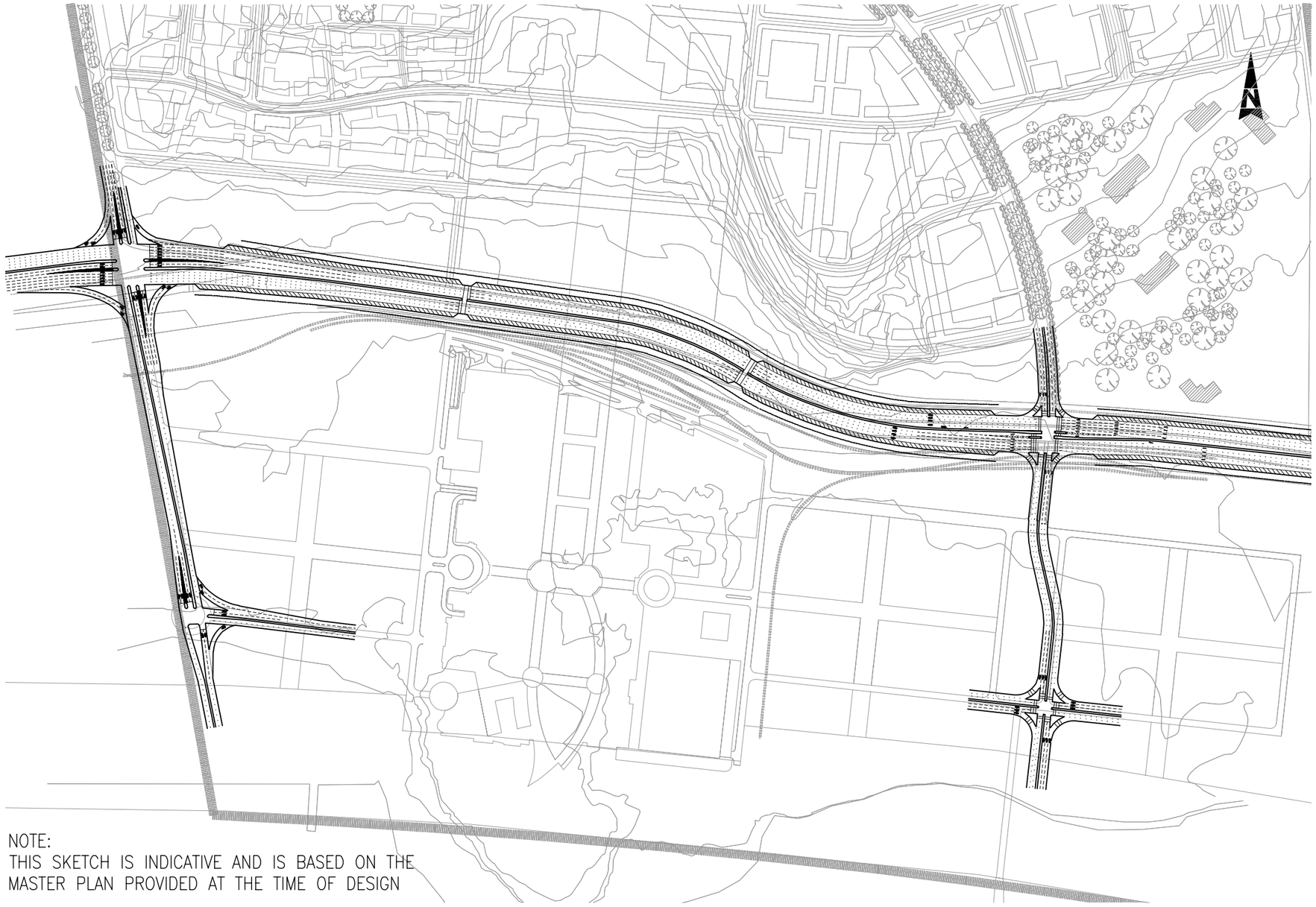
It is assumed that the Shopping Mall will be built incrementally over number of phases starting with Phase 1B. The scale of the development proposal will have a direct impact on the scale of highway improvements suggested. We have assumed that the hypermarket element of the Shopping Mall will be developed in Phase 1B. The highway improvements to the junction between Nobel Avenue and Khagani Rustakov Street (providing full turning movements) will accommodate these trips.

As the Shopping Mall is further developed, more highway improvements measures are required, such as the new junction between Nobel Avenue and Central Avenue (identified in Phase 2A). It should be noted that once the Shopping Mall is developed and fully occupied, the volume of traffic generated by this element of the development would mean that the two junctions on Nobel Avenue would be close to or at capacity. ADEC has requested that additional access options are considered for Nobel Avenue.

Thus, four options have been proposed for the design of Nobel Avenue and associated access points, all of which conflict with the existing railway line. The four options are shown in Figures 6.20 to 6.23

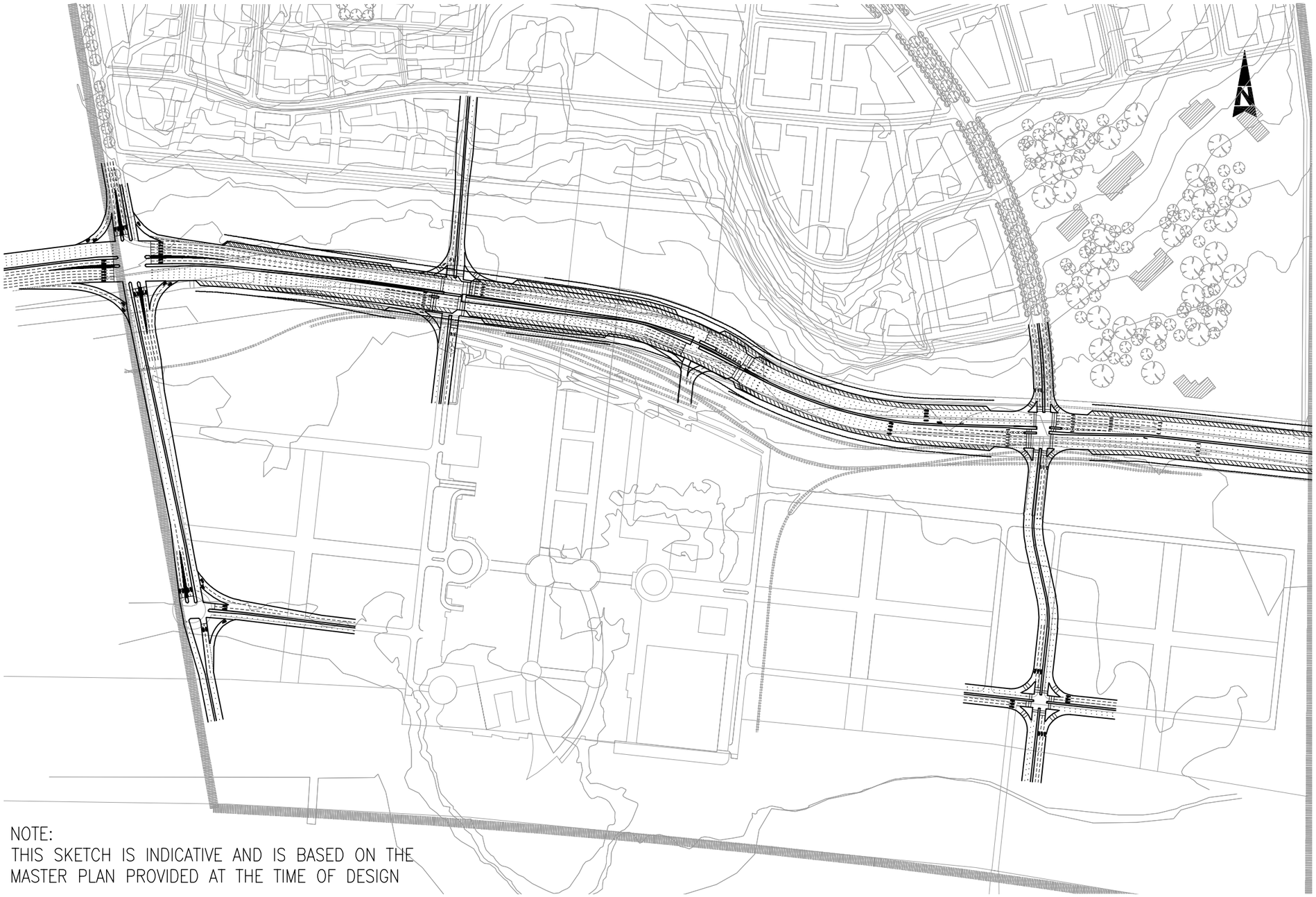
- **Option 1** shows the design as advised by ADEC. This option would entail maintaining Nobel Avenue and providing additional parking and a footpath adjacent to Nobel Avenue. It is understood that the typical width of Nobel Avenue would be 58m, with two main junctions to the east and west of the Shopping Mall. This option is considered unsafe as it assumes that vehicles will reverse onto Nobel Avenue. With no intermediate junctions between Central Avenue and Khagani Rustakov Street, this option would create the feel of a high speed expressway rather than the urban roads desired by ADEC. This option will also cause capacity and queuing issues at the two main junctions to the east and west of the Shopping Mall.

Figure 6.20 Shopping Mall measures - option 1



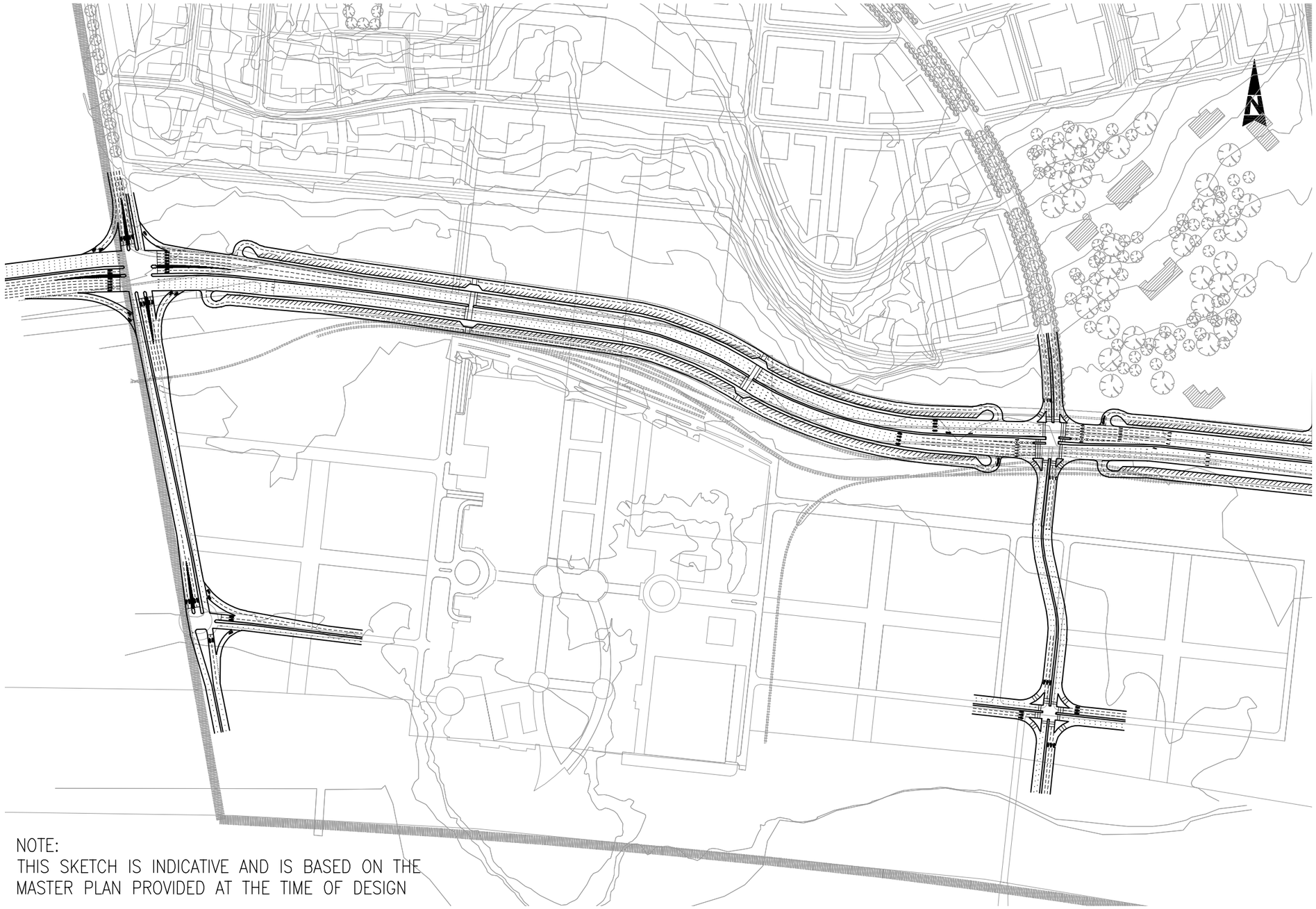
- **Option 2** again shows the design as advised by the client, but with additional two junctions between Central Avenue and Khagani Rustakov Street as requested by ADEC at the workshop in London on 18th July 2008 workshop. This option is also considered to be unsafe, as vehicles will still be able to reverse onto Nobel Avenue. However, this option would provide more access options to the Shopping Mall and create the urban environment desired by ADEC at the workshop in London on 18th July 2008 workshop.

Figure 6.21 Shopping Mall measures - option 2



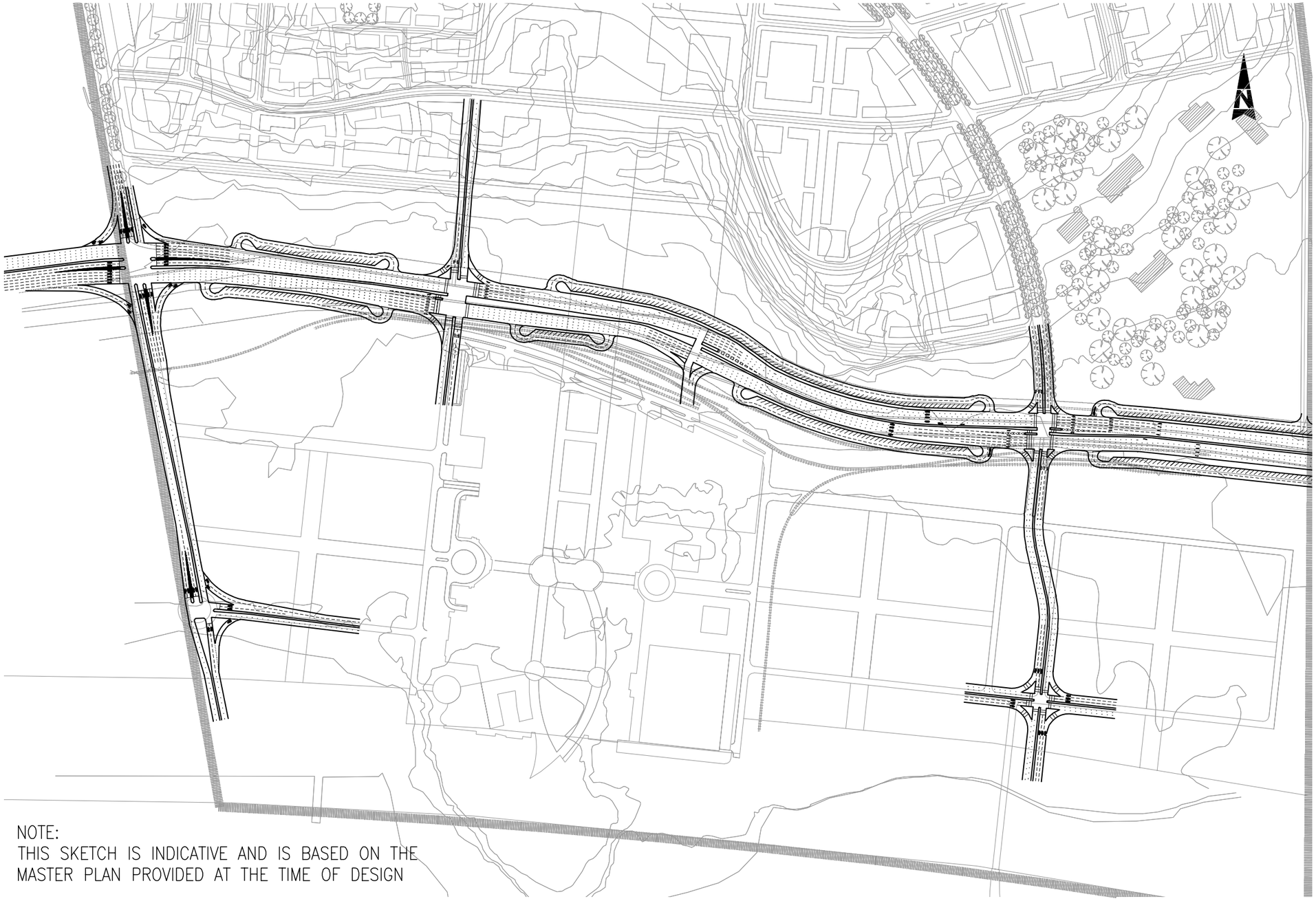
- **Option 3** shows the design preferred by the local highway authority. With no intermediate junctions, Nobel Avenue acts as a barrier to access between development zones either side of the highway, while creating pressure on the two main junctions to the east and west of the Shopping Mall. This option would entail the provision of two ancillary lanes, parking and a footpath adjacent to Nobel Avenue. The typical width of Nobel Avenue would be approximately 66m with two main junctions to the east and west of the Shopping Mall. It should be noted that the junction widths will be greater to accommodate the high volume of traffic flows. As with Option 1, there are no intermediate junctions between Central Avenue and Khagani Rustakov Street and thus, this option would create the feel of a high speed expressway rather than the urban environment desired by ADEC. This option will also cause capacity and queuing issues at the two main junctions to the east and west of the Shopping Mall. However, this option would provide more flexibility to traffic due to the two-way ancillary roads and improved access to retail development fronting the road.

Figure 6.22 Shopping Mall measures - option 3



- **Option 4** shows the preferred option. It is a similar design to Option 3 but with two additional junctions between Central Avenue and Khagani Rustakov Street as requested by ADEC at the workshop in London on 18th July 2008 workshop. This design provides for maximum flexibility in terms of traffic/ pedestrian movements, access to the Shopping Mall and improved safety.

Figure 6.23 Shopping Mall measures - option 4



Public Transport

Bus network

It is essential for the development of this site that the bus service is developed progressively in line with the phasing of the development. The trip generation assumes a high modal share for buses in some development zones. There would need to be long distance buses as well as local buses which will connect different zones of the development. Early discussion with bus operators is recommended to ensure that the public transport provision to the site is provided at the outset.
Metro

A new Metro station in the CBD will be constructed as part of Phase 2A, and would be linked to the existing Baku Metro network. We have been advised by the client team that the Metro station will be built within the next 5-10 years.

Tramway

As part of Phase 3 of the development, a tramway will be constructed along the Caspian Sea waterfront, which would serve the Waterfront West, Shopping Mall and Waterfront East development zones. This provides another form of public transport provision to the southern part of the development where the walking distance to the Metro station may discourage use of the Metro as the preferred choice of travel.

6.4. ROAD HIERARCHY

A road hierarchy has been identified based on the characteristics of the roads, their importance in relation to movement needs within the Master Plan, and the work described above on road width requirements. The road hierarchy also follows the traffic assessment described in earlier in this report.

The proposed network encompasses the existing roads as far as possible. The roads vary from 4-lane dual carriageways (Nobel Avenue and Babek Avenue) to 2-lane dual carriageways (Central Avenue, Khagani Rustakov Street and Suleyman Vazirov Street), and residential roads. All of the roads proposed in the Master Plan will have pedestrian footways.

The highway boundary assumed for various road types will range from 20m for residential roads to approximately 70m for the 4-lane dual carriageways.

The proposed road network and its hierarchy are shown in Figure 6.24.

The proposed road network has been designed following analyses of road hierarchy and capacity. The expected traffic levels have had a major role in determining the width of the roads in the Master Plan, in accordance with the results of the trip generation and assignment analyses.

Road Capacity and Classification

Primary Roads

It was considered that the primary internal roads within the Masterplan would be the equivalent to UAP2 roads (Urban All Purpose Road 2) in the UK Design Manual for Roads and Bridges (DMRB), with a width of 14.6 metres. These roads will have a capacity of approximately 2,100 vehicles per hour in each direction.

A UAP2 road typically has:

- Frontage access and more than 2 side roads per km;
- A speed limit generally in the region of 30-40 mph (approximately 50-60 kph);
- Restricted parking / loading;
- Pedestrian crossings, with some at grade; and
- Bus stops at the kerbside.

Secondary, Distributor and Local Roads

Other roads in the Masterplan have been designed as the equivalent to UAP3 roads with one lane in each direction and widths varying from 6.75 to 9.00 metres. These roads will have a capacity of 1,100 to 1,530 vehicles per hour in each direction.

UAP3 roads typically have:

- Frontage access;
- A speed limit generally in the region of 30-40 mph (approximately 50-60 kph);
- Unrestricted parking / loading;
- Pedestrian crossings at grade; and
- Bus stops at the kerbside.

Figure 6.24 Road Hierarchy

PARKING PROVISION

The Atkins Masterplanning team has advised the use of European car parking standards for residential units as follows:

- 1.25 spaces per residential unit; and
- 1.5 spaces per residential unit for buildings > 8 storeys. 5.14

US car parking rates have been used for the other land uses as follows:

- Comparison retail (Babek Av. / Garden City N.) 3 spaces per 1,000 square feet of GLA
- Comparison retail (other areas) 5 spaces per 1,000 square feet of GLA
- Convenience retail 3 spaces per 1,000 square feet of GLA
- Office 3 spaces per 1,000 square feet of GLA 5.15

As described in section 3, the GFA for ITE land use 820 (Shopping Center) has been reduced by 20% to convert it to GLA. As parking rates for other comparison retail, convenience retail and office land uses are by GLA, the parking rates have therefore been reduced by 20%. 5.16

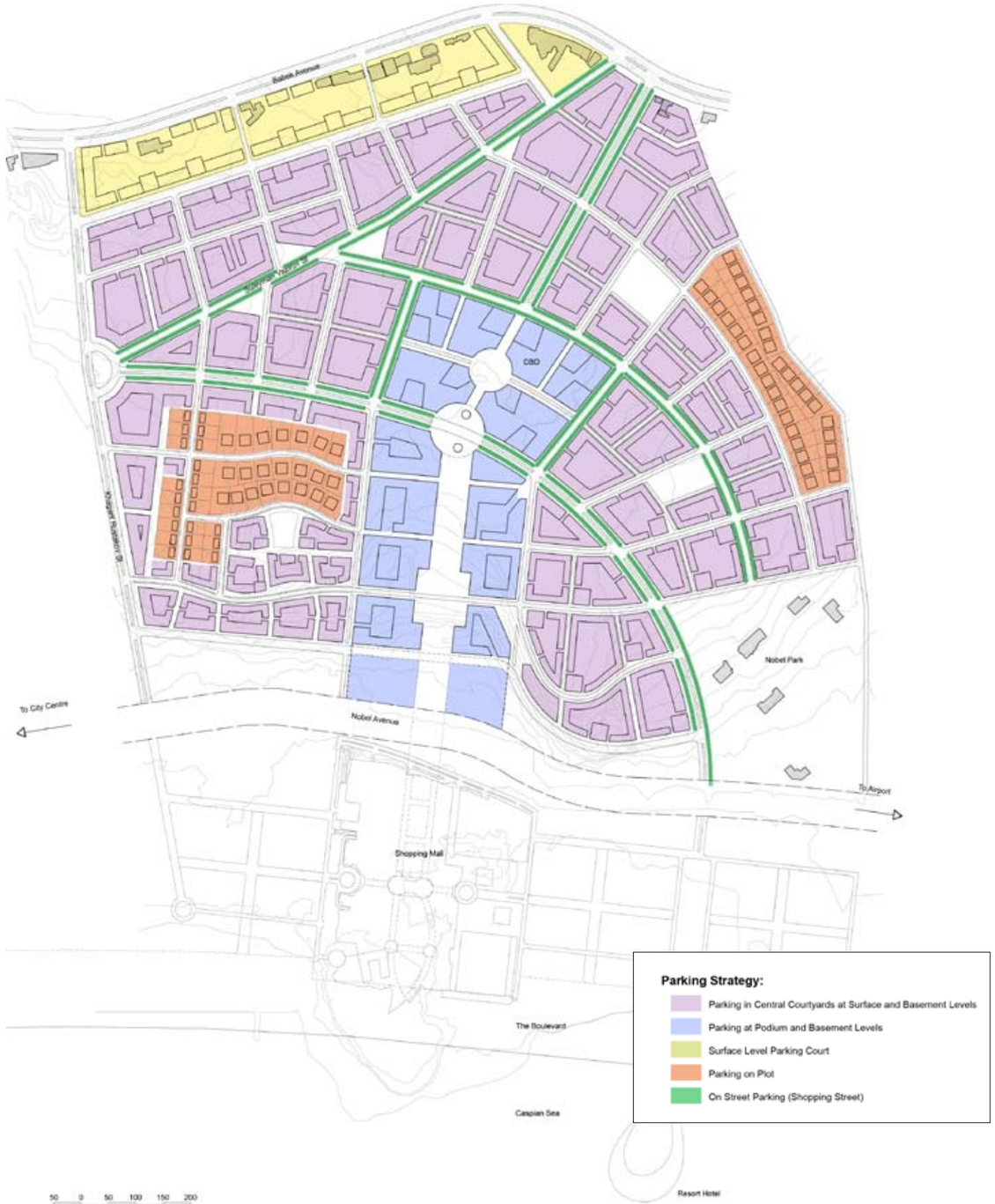
All parking rates have been reduced by a factor of 30% to account for internalised trips. 5.17

The resulting parking provision by development zone is shown in Table 6.3 below.

Table 6.3 – Parking provision Development Zone Parking Spaces

Babek Avenue Strip	1,466
Babek Quarter	10,510
The CBD	4,792
Garden District	3,856
Central Gardens	4,649
Nobel Heights	4,489
Waterfront West	2,757
Shopping Mall	5,562
Waterfront East	4,930
Total	43,010

Figure 6.25 Parking Strategy



7. URBAN DESIGN FRAMEWORK

CREATING AN URBAN STRUCTURE

The layout of the new city district is based on a clear street pattern which will create a well connected, convenient and safe network of routes and define a coherent urban structure.

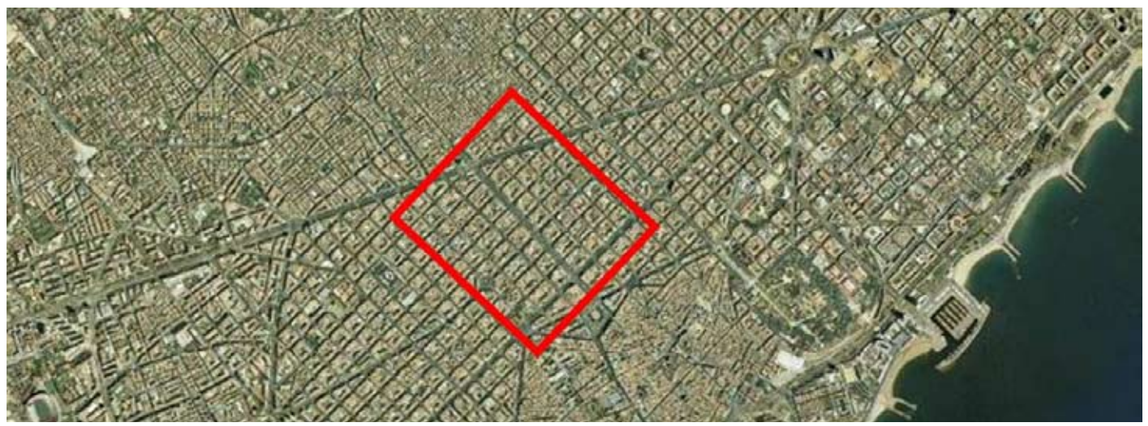
The proposed pattern of streets and spaces incorporates existing historic routes through the site, for example, Suleyman Vazirov Street. A curving Central Avenue provides the main east-west route and structuring element for the area to the north of Nobel Avenue. This important thoroughfare is envisaged as a true urban boulevard and "main street" for this new community. It should become a significant destination in its own right, as well as being an important transportation corridor.

The Central Avenue connects the CBD to Nobel Avenue and Khagani Rustanov Street, another main avenue connects the CBD to Babek Avenue. With this main lattice of transport routes in place the remainder of the northern part of the development area has been sub-divided into a loose grid of urban blocks defined by neighbourhood streets.

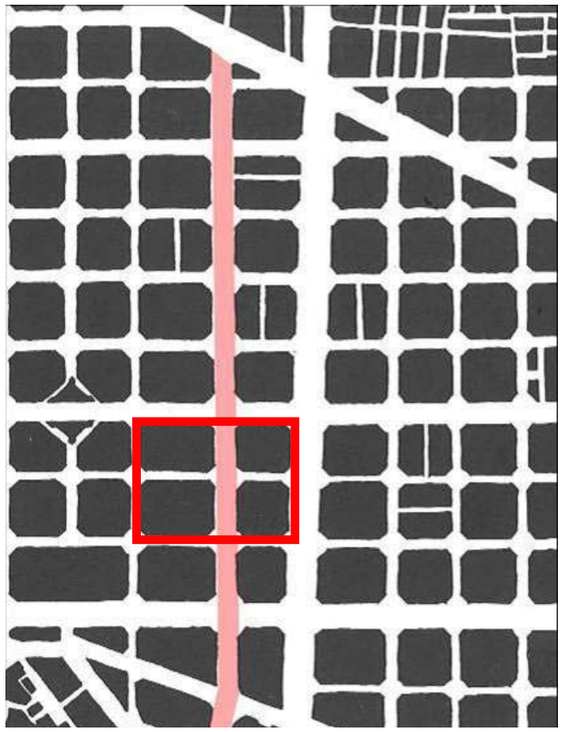
The most fundamental requirement in structuring built form within development blocks is to make a clear distinction between public fronts and private backs. Buildings which front streets, squares and parks present their public face to the outside world and give life to it.

Lining the edges of development blocks with a perimeter of buildings is the best way to accommodate a diversity of building types and uses at medium to high densities. Continuous building lines along a block edge are more successful at providing good enclosure to a street or square.

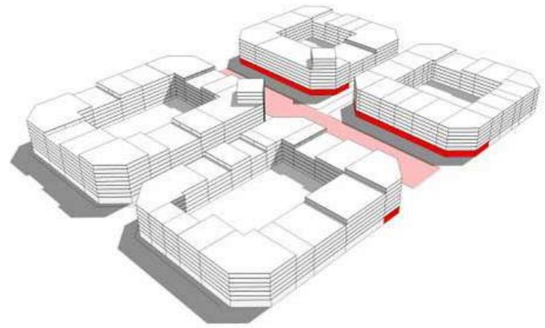
Square and rectilinear blocks offer the most flexible basis for accommodating a range of commercial and residential buildings. The perimeter block structure enables a range of options for the interior including car parking, communal gardens, or pocket parks. The following pages illustrate examples of successful perimeter block development in London, Paris and Barcelona.



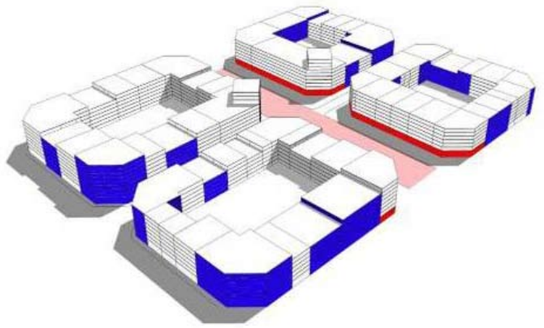
Barcelona is one of the best examples of perimeter block development based on a grid



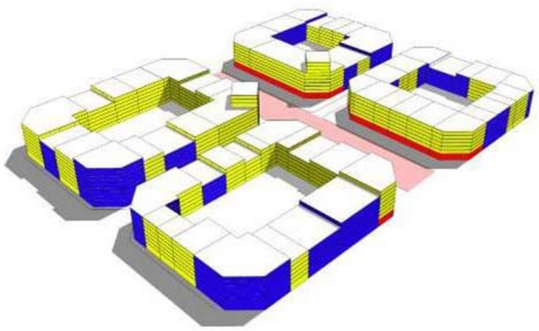
Retail



Commercial



Residential



STREET BLOCK PRINCIPLES

The street block layout set out in the overall Master Plan Figure 3.1 establishes the basic urban form for Black City. The key urban design principles are set out below:

- Successful urban space is defined and enclosed by buildings. Buildings should follow a continuous building line around a street block for at least 80% of the frontage.
- A clear distinction should be made between the public fronts of buildings facing onto the street and private space within the internal courtyard.
- Projections and setbacks from the building line, such as bays and entrances add valuable emphasis without disrupting the principle of continuity.
- Building entrances should be clearly identifiable and help create activity on the street.
- Access to internal courtyards such as for parking, requires careful control by means of gates.
- Buildings at the corner of street blocks can highlight the junction, for example by architectural feature, a punctuated roofline or use of colour.
- Setbacks at upper floors reduce a building's impact at street level by allowing one or more upper storeys to be less visible from the street.
- Courtyards must be considered as a multi-functional space and the focus for the residents of the block to meet and for children to play.
- The ground floors of street blocks should be occupied by uses that relate directly to pedestrians and create activity and interest.
- Privacy for ground floors of residential development on quieter streets can be maintained by raising the floor above street level.
- Where shared (but not public) space is provided in internal courtyards, the privacy of ground floor rear rooms can be protected by private terraces or gardens.

The development parcels within the master plan have been established to provide a high degree of flexibility with respect to both building types and the size range of individual development opportunities. The street blocks are typically of a size (1-2 hectares) that would allow a single developer to construct or be sub-divided into two. Flexibility is also provided as to the inclusion of retail and commercial uses on the ground floor of apartment blocks.

The dimensions of development parcels have also been established to provide a degree of flexibility with regard to parking and servicing. Options for both above and below grade parking are illustrated on the accompanying diagrams.

Below grade basement parking can be accommodated on 1 to 2 levels on each parcel. Alternatively, above grade parking within the centre of perimeter street blocks could be accommodated and contained by the ground floor of the building with a communal open space above. This range of parking solutions should give developers sufficient flexibility to achieve economically viable parking solutions.

BUILDING TYPOLOGIES AND HEIGHTS

Refer to Figure 7.1

Building Heights

Most buildings within the residential areas of the master plan will be around 8-10 stories high, with taller buildings located at the CBD, the Shopping Mall and at other strategic locations. Figure 7.1 illustrates the structure of the building heights framework proposed for the master plan.

- In order to take advantage of the excellent public transport accessibility within the CBD, building heights should be highest within this area and then reduce outwards to the development's edge, where accessibility is lower
- Building heights will be higher at key gateways where landmark buildings are required to signal the arrival and departure from the development
- Higher building heights where development overlooks Nobel Park to take advantage of the excellent views and amenity offered by the park
- Building heights will be higher on areas of high ground to allow views out towards the Caspian Sea
- Building heights will be higher where commercial development fronts onto potentially noisy traffic arteries, such as Nobel Avenue, in order to provide protection to other residential neighbourhoods.

Figure 7.1 Building Typologies and Heights

High Rise Apartment and Offices

To the north of Nobel Avenue, high rise towers are grouped in the CBD, on the ridgetops overlooking Nobel Park in the Nobel Heights character area and on the south facing ridge within the Garden District.

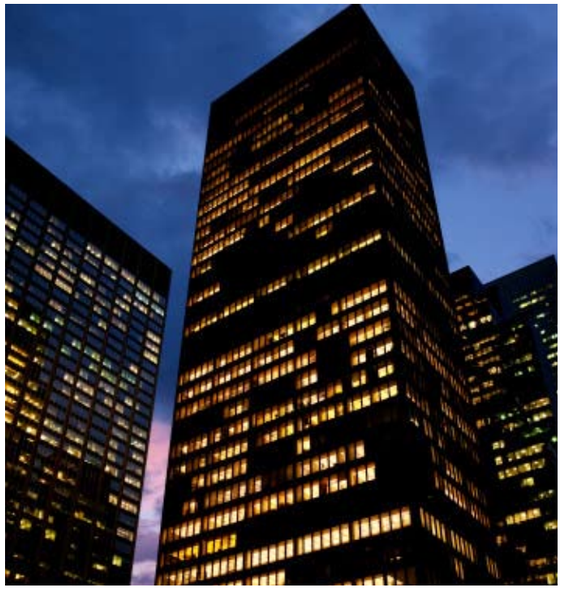
Within the CBD the cluster of towers vary in height from 20-40 storeys. The height of these buildings is significantly above the adjoining urban area which is formed by perimeter street blocks, typically 6-8 storeys in height. This juxtaposition in height will create a clearly defined and legible skyline for the CBD.

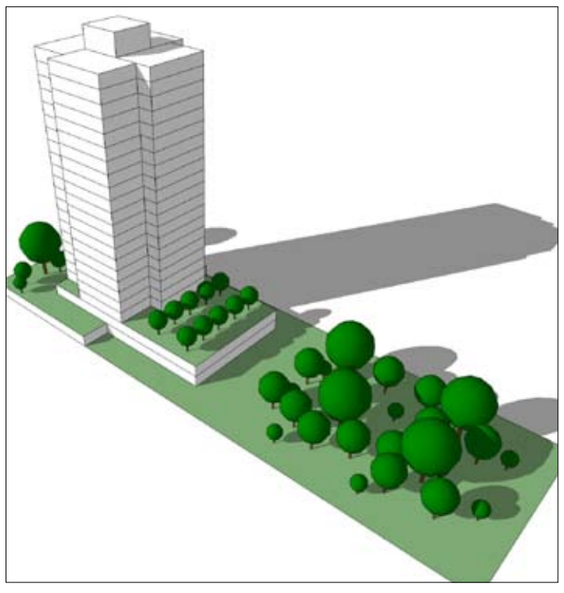
The towers within the CBD should be flexible to allow a mix of uses – offices, residential or hotel depending on market demand. This group of buildings should be considered as one composition to create a distinctive and visually interesting skyline.

Parking for the towers within the CBD would be contained within a podium at the base of the buildings. Due to the close proximity of the future metro it is proposed to reduce the parking standards to 0.5 space per apartment.

Smaller residential towers, 18-22 storeys in height, are sited on higher ground and ridgetops overlooking Nobel Park and the sea. These individual towers form part of a wider street block layout, with the towers typically at the corners of blocks. The towers are usually on sloping ground or ridgetops sited to maximise sea or park views.

Residents parking would be accommodated at the base of the tower in a podium or basement structure. The sloping topography allows in certain locations, parking to be cut into the hillside.





Commercial Showrooms with Mixed Use Towers

Commercial showrooms and garages already partially front onto Babek Avenue. It is proposed to reinforce this character by infilling gap sites with new showrooms and commercial buildings. A new commercial street is proposed parallel to Babek Avenue with further space for showrooms and a range of commercial premises. Small towers up to 12 storeys in height could provide cost effective office or residential accommodation above commercial uses.

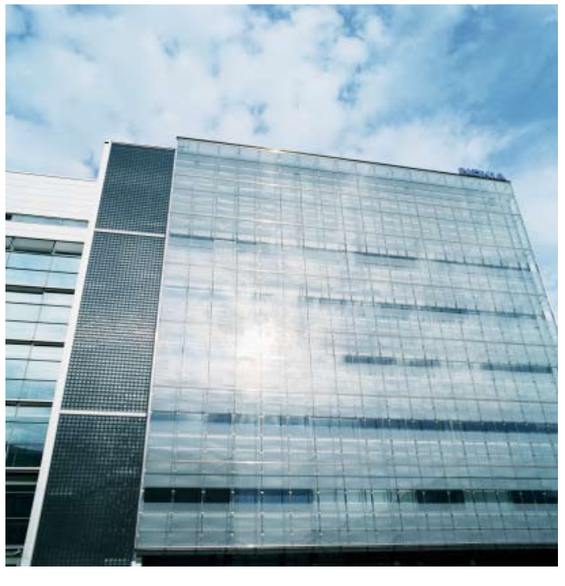
Convenient layby parking will be provided on-street, together with internal parking courts and limited podium or basement parking.

Institutional Buildings with Mixed Use Towers

Space is reserved in the master plan either side of the Central Gardens for institutional buildings such as schools, sports centres, and other cultural and community facilities. These larger footprint buildings are typically organised around a central courtyard or atrium with visitor parking beneath the building at basement level.

It is important the ground floor of the buildings facing onto the Central Garden provides an active frontage with cafés, restaurants and bars spilling out onto raised terraces during the summer months.

The institutional uses would generally occupy the first 3 – 5 storeys. The opportunity then exists to place mixed use towers, 8 – 10 storeys in height, above this podium level with views over the Central Gardens.



Buildings Fronting Shopping Streets

The main avenues within the new city district will also be the most important shopping streets. The gently curving Central Avenue is intended to be the most prestigious with shops and commercial uses on the ground floor and apartments or offices above. The buildings should provide a continuity of elevation along avenues. This can be achieved by shop fenestration and entries, heights of shop signs, storey heights and consistency in cornice heights.

The design of the public realm should also be carefully considered with a strong structure of mature trees, high quality and attractive paving materials and well designed street furniture. Several 'events' will be celebrated as defining features at key places along the Central Avenue:

- the junction with Nobel Avenue
- the Central Plaza between the CBD and Central Gardens
- the Crescent forming the western gateway at the intersection with Khagani Rustanov Street

The main avenues will also be important public transport corridors with bus stops at key locations. These are to be well lit, accessible, attractive and safe.

Mid Rise Apartments

Mid rise apartments, generally 6-8 storeys high, are the most common residential building typology in common with the rest of Baku. The apartments are typically grouped around the perimeter of a street block enclosing an internal courtyard. Local shops and commercial activities are often introduced at ground level to activate the street edge.

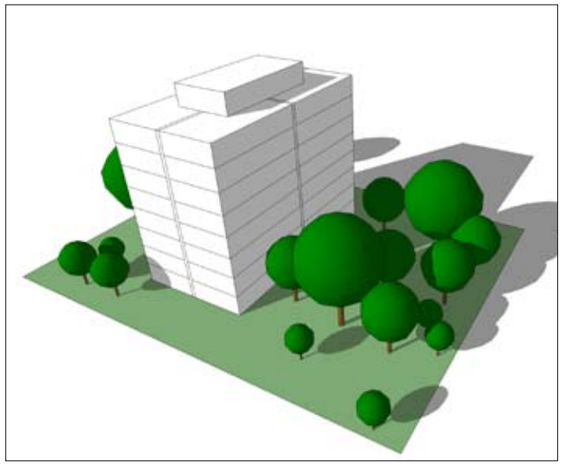
Apartments vary in size from 80 to 160 m^2 and usually occupy the full width of the block to allow natural ventilation. The majority of apartments would have their own balcony or terrace. Penthouse apartments would be at the top of the block or at corners. The public elevation of the apartment block will define and enclose streets and squares. This 'street wall' will typically follow a straight building line. Stepping back upper floors will help reduce the building's impact at street level and allow an increase in density without an equivalent increase in the sense of scale.

Generally there is regularity to the roofline of apartment blocks, often the full length of the street, which is reinforced by the arrangement of projections on the roofline such as dormer windows, parapets etc. Junction of streets provide the opportunity to highlight the corner by increasing the height of the block, or orientating the front elevation at 45 degrees to the corner.

Resident parking will typically be accommodated in a single level basement beneath the apartment block and/or in a communal underground car park beneath the central courtyard. This has the benefit of allowing the majority of the central courtyard to be designed as a semi-public/private outdoor space for the use and enjoyment of residents. Depending on the size of the courtyard, limited car parking can be introduced, but it must not dominate the space, and be designed with paved shared surfaces giving priority to pedestrian movement. Visitor parking will generally be provided on-street outside of the block. Central courtyards and underground car parking will need a high quality of management and maintenance to be successful. This could involve the establishment of a Management Company paid for by residents by means of an annual service charge.

Villas

Villas are proposed within two of the character areas – The Garden District and Nobel Heights. Plot sizes vary from 1000 to 1200 m2. Villas sit further back from the road than apartments and within their own grounds. They are detached and generally 2 to 2½ storeys high. Porches are often expressed as features and roofs are important elements of the overall composition. Facades are usually formal with well proportioned openings symmetrically composed. Within the Garden District a prestigious street of detached residences will be marketed for embassies.



VIEWS AND LANDMARKS

The urban design of the new district will be based on a clear hierarchy of views and landmarks. Landmarks are highly individual structures which help people orientate themselves through what would otherwise appear to be a homogenous environment. They include tall or singular buildings, gateway structures and bridges, often sited at the end of view corridors.

The tallest and most visible buildings in the new district will be the two towers to be designed by Foster and Partners next to the Shopping Mall. Building heights within the waterfront zone to the south of Nobel Avenue should be carefully controlled to ensure that views to these two landmarks are not compromised.

The cluster of high rise buildings in the CBD will create the second tallest group of buildings and given the elevated topography in this area will form a dramatic skyline visible from The Waterfront, Nobel Avenue and Babek Avenue. The view looking north to the CBD from within the Central Gardens will be particularly important. The tree lined avenues along two of the district distributors within the site will also frame views to this impressive group of buildings.

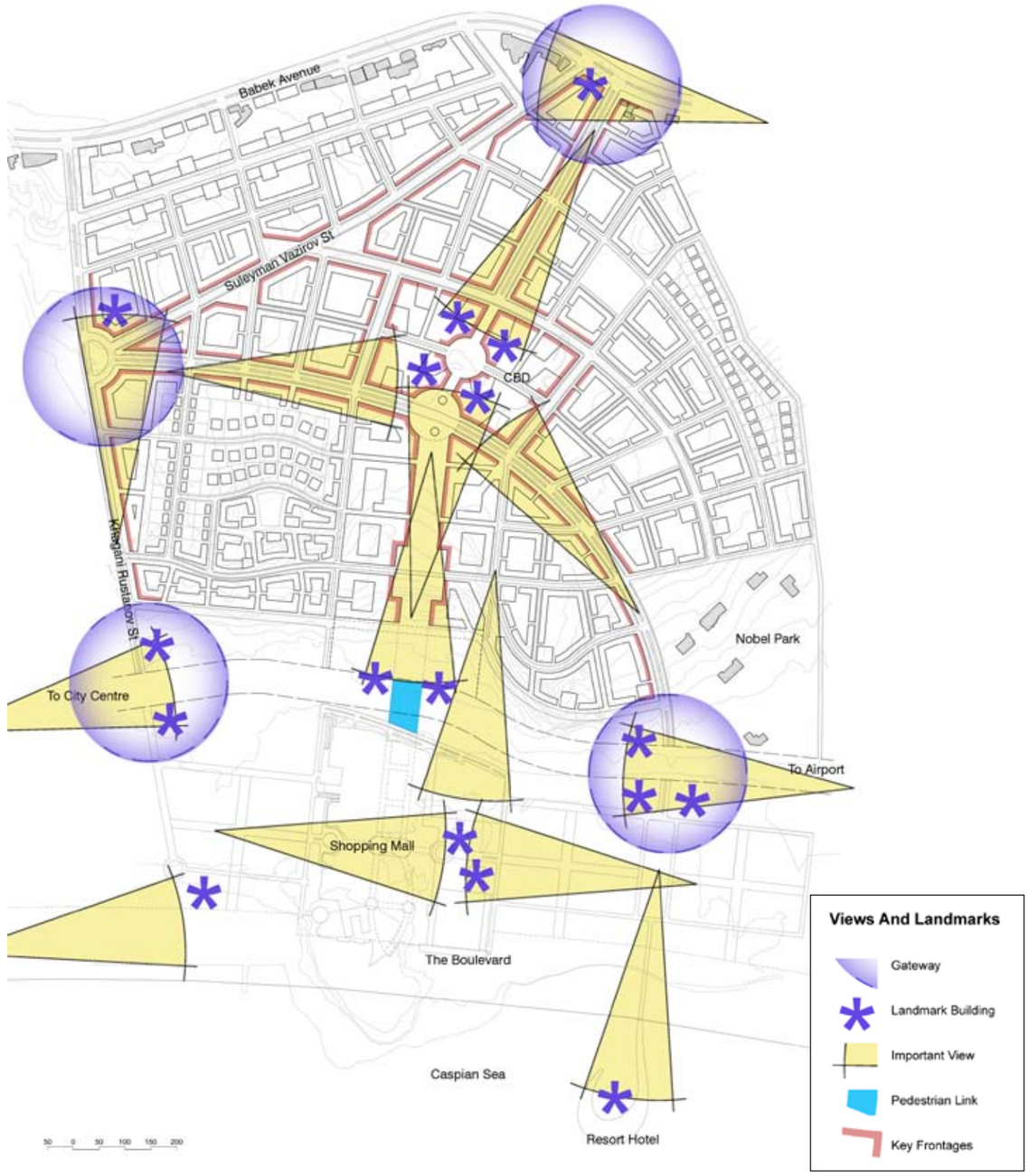
Tall buildings will also mark the gateways to the new district, in particular at the entrances either end of Nobel Avenue. High quality planting and the use of public art and fountains will also combine to define the gateways to the new district.

Views looking south to the Caspian Sea will be created by the north-south alignment of the road and pedestrian network. These views will be emphasised by the ridgeline which crosses the site to the north of Nobel Avenue.

The elevated bridge over Nobel Avenue connecting the Central Gardens with the Shopping Mall should be a dramatic structure. It will be in a highly visible location seen by thousands of people every day as they travel in and out of the city centre.

The future resort hotel is set on a promontary within the Caspian Sea, an important view corridor is provided across parks and gardens to this landmark building.

Figure 7.2 Views and Landmarks



8. LANDSCAPE FRAMEWORK

The network of open spaces within the new city district is made up of a variety of elements, ranging from pedestrian priority streets, public parks, the water's edge boulevard and a series of public squares, semi-public spaces and private spaces related directly to the residential environment. The defined public spaces that make up the primary public and spatial framework for Black City are:

- The Boulevard Park
- Nobel Park
- Central Gardens
- Central Plaza
- Pedestrian Streets and Squares
- Avenues

First, there is the network of overtly public spaces – the streets, parks and water's edge boulevard. These spaces give Black City public scale and sense of accessibility and accommodate a broad range of public, cultural and commercial activities. As major public amenities, they will make the new district a more desirable setting to work, live and play.

Second, there is a series of semi-public open spaces planned within the site's privately owned parcels and at other inner-block locations. These spaces are more intimately scaled extensions of the public realm and primarily serve as places of transition or interface with the residential environment and at times, as small residential squares. Conceived of as pedestrian priority spaces, these will provide traffic calmed routes through neighbourhoods.
Finally, there are other open spaces directly related to the residential environment that are primarily private in nature.

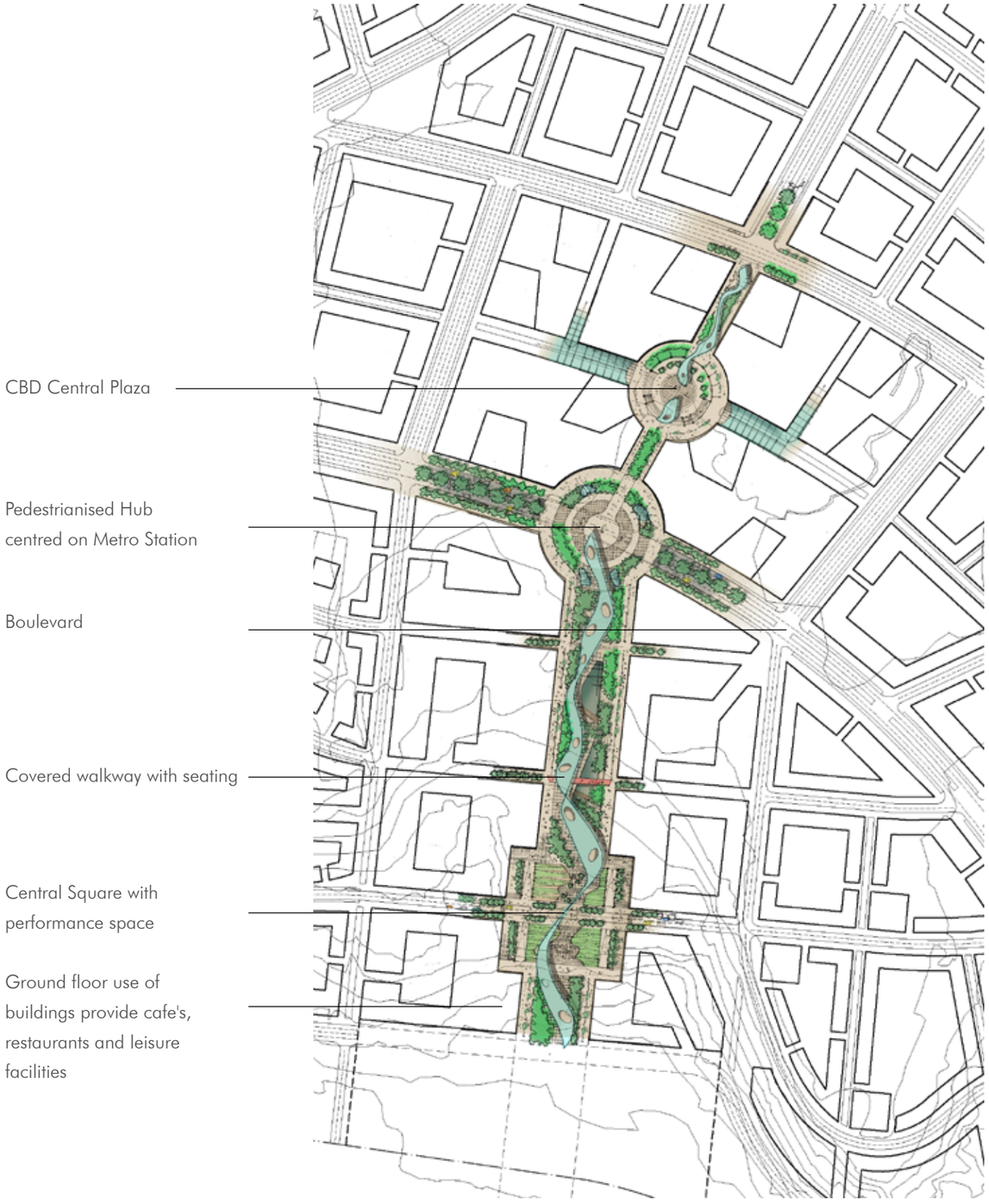
Figure 8.1 Landscape Framework

BOULEVARD PARK

One of the most dramatic features of the city centre of Baku is the wide, densely planted, Boulevard Park along the seafront. This provides the setting for a range of leisure and recreation activities, particularly in the summer months. It is a long term plan of the City Authorities to extend the Boulevard eastwards as former industrial and port related facilities are redeveloped, this will involve reclamation of land from the sea. The developers of Black City fully support this initiative and have allocated a wide strip of land along the waterfront in front of the proposed Shopping Mall.

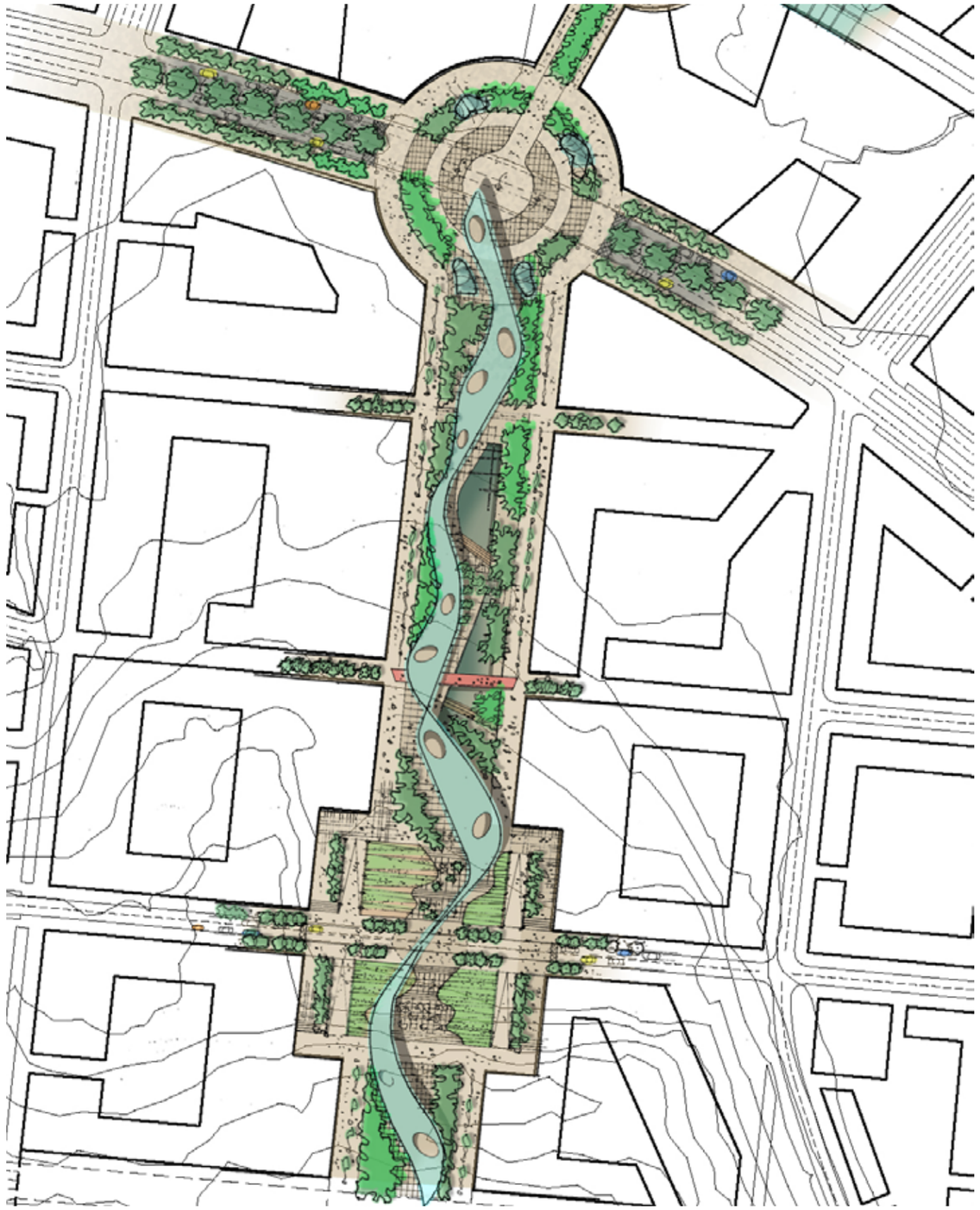
NOBEL PARK

This historic park is named after its association with the Nobel Brothers who established the Nobel Brothers Oil Producing Company in Baku in 1879. The prestigious Nobel Prize, which is widely regarded as the highest recognition of intellect was established in 1901 from Alfred Nobel's will after his death. Between the residential and industrial sections, of Baku, familiarly known even to this day as "White City" and "Black City", the Nobels built their own residence which they called Villa Petrolea and around which they developed the park. The 10 hectare park was created in 1883 by the well-known European botamist E Beckle using more than 80,000 plants and trees, many of which had never been cultivated in Baku. The residence has recently been rehabilitated into a museum. The remainder of the park, however, is in a poor condition and as part of the redevelopment of Black City it is the intention of ADEC to restore the park to its former glory.



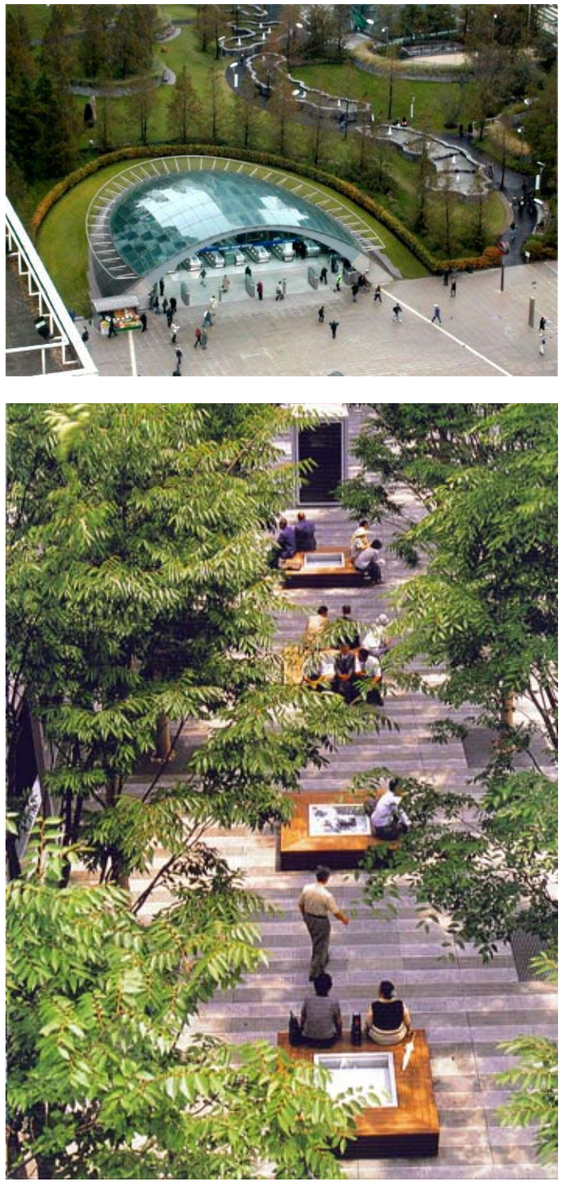
CENTRAL GARDENS

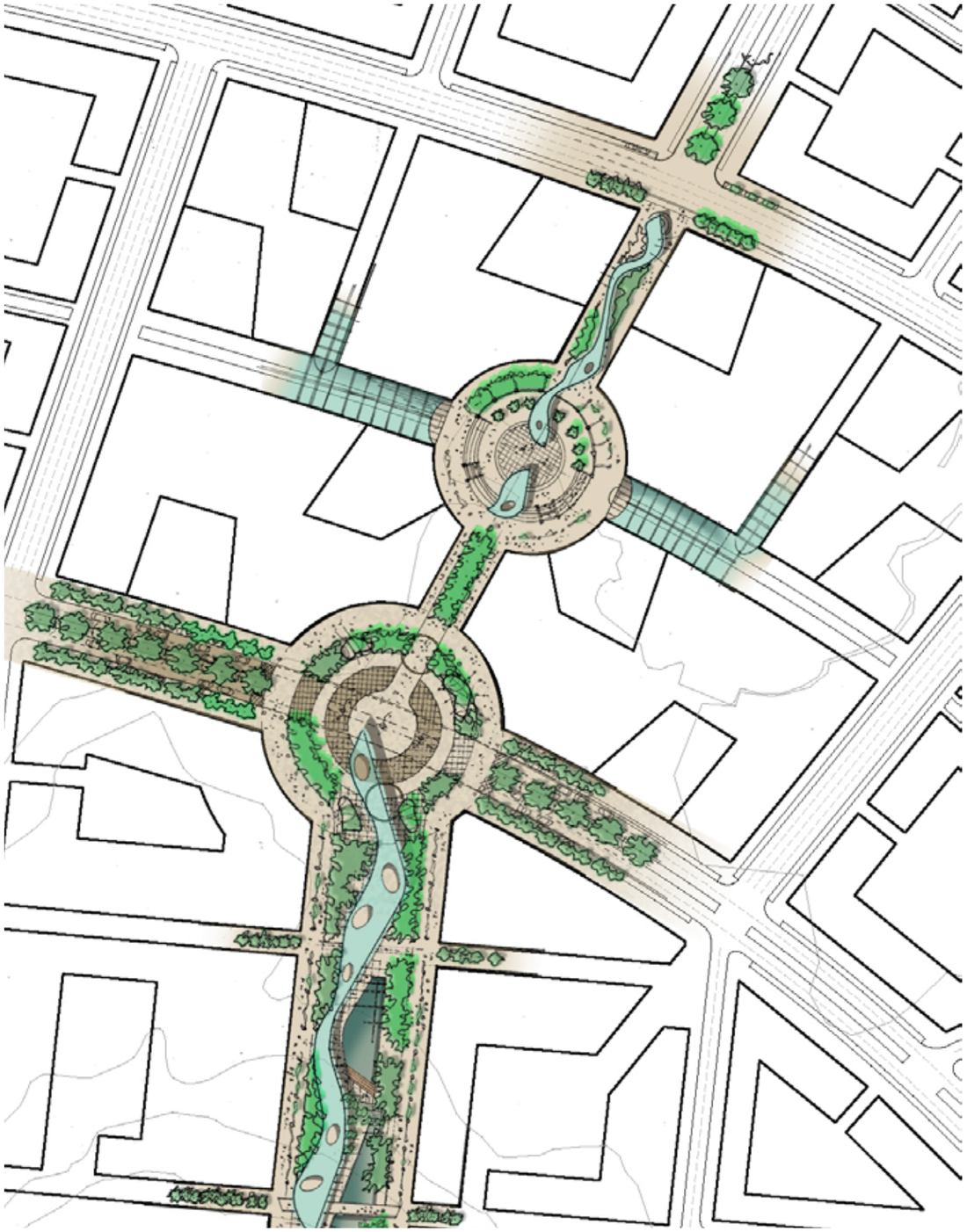
Running directly north-south through the new city district the Central Gardens will connect the proposed Central Business District with the Shopping Mall, via a bridge over Nobel Avenue. This linear park will be framed by high quality apartments and civic buildings. The sloping topography provides the opportunity to create a series of terraced gardens enjoying south facing views to the sea. Set within the park will be cafes, restaurants, a range of leisure facilities and children's play areas.



CENTRAL PLAZA

At the heart of the CBD will be the Central Plaza, this circular space will be enclosed by shops, cafes and restaurants. The proposed metro station will be positioned below the plaza with lifts and escalators connecting to the station platforms.



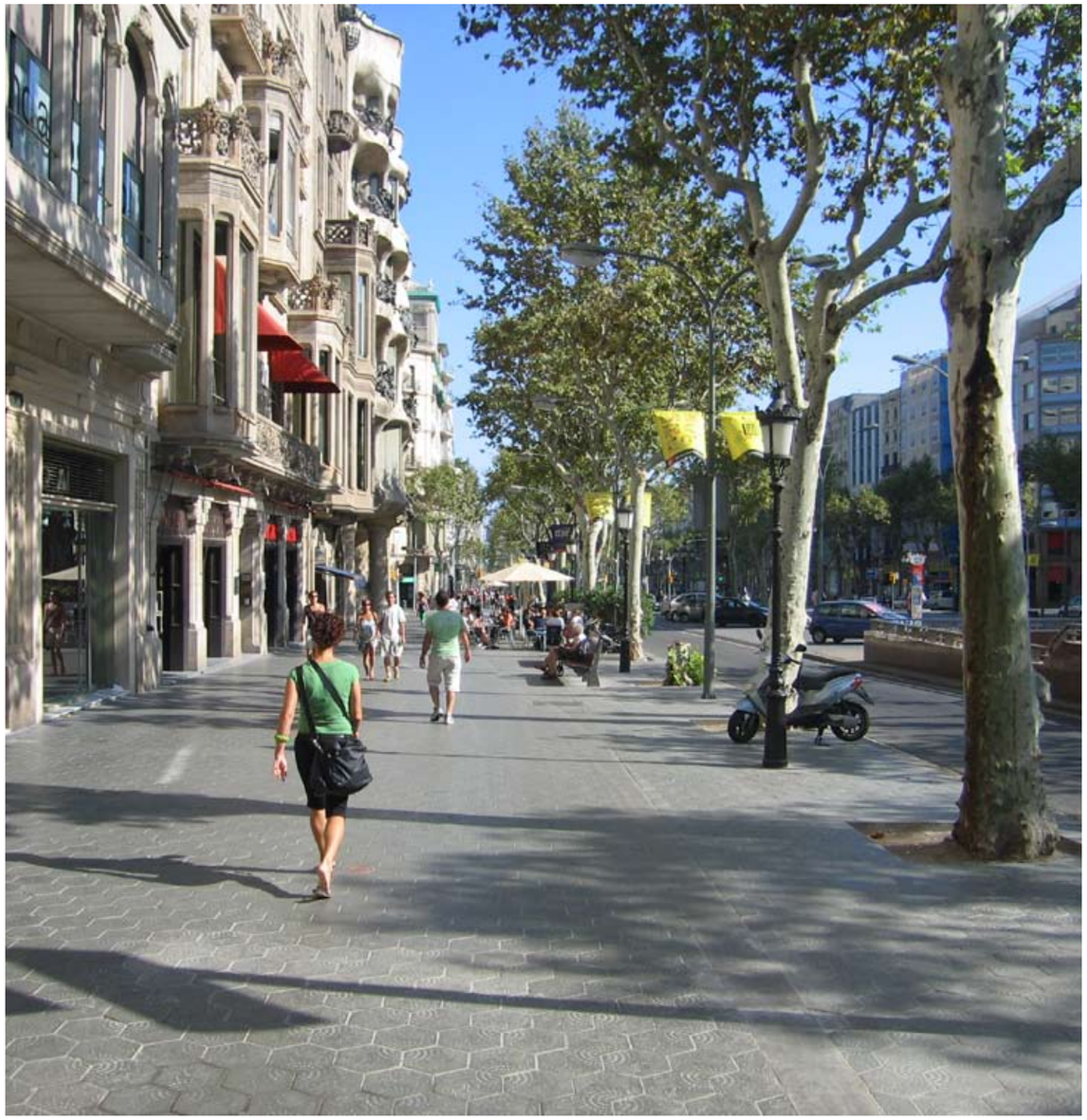


PEDESTRIAN STREETS AND SQUARES

A network of pedestrian streets thread through the residential neighbourhoods of the new district linking housing to the CBD, the main parks, the Waterfront Boulevard and the Shopping Mall. At the junction of these tree lined routes small urban squares provide the focus for communities within housing neighbourhoods. This green network will provide safe, comfortable and attractive routes for pedestrians and cyclists, in particular children. Play and seating areas will be sited within squares.

AVENUES

A particular feature of Baku are the tree lined avenues in the centre of the city. Street trees are proposed on all categories of road to provide shade and shelter, and to "green" the urban environment. The three main distributor roads which bring traffic into the new district will have avenues of trees including a planted central median.



9. UTILITIES

This section includes an assessment of the utility infrastructure requirements for the proposed Black City project. Information has been sought from the Client where available.

Conceptual utility load demands have been calculated based on the interim overall Master Plan development schedule. At this concept stage of the project, the design accuracy for utility load estimations is approximately ± 25%. The load demands reported in this document should be considered as bulk estimate loads only for master planning purposes. Inasmuch as most of the information requires further confirmation, various assumptions will need to be confirmed at a later stage once the Master Plan is established.

UTILITY SERVICES REQUIREMENTS

Basis of Design

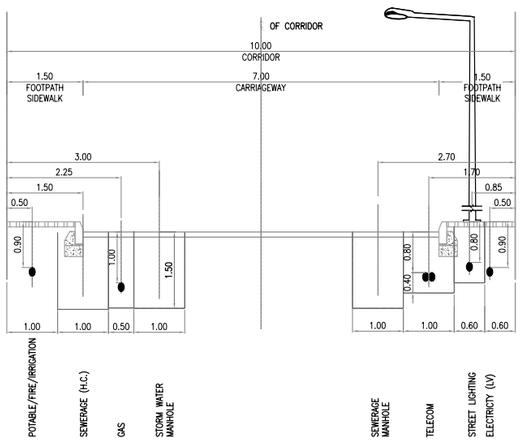
Sitewide utilities are required for the operation of the Black City development and this section assesses the services required and the proposed infrastructure systems for further design and subsequent implementation. Primary basis of the design has been the interim stage 2 Master Plan and development schedule provided. Each of these services has been conceptually designed following internationally accepted design standards and criteria, notably with reference to British Standards (BS) and GOST/SNiP, where applicable.

A dedicated service corridor has been provided covering all the services to the buildings/premises within Black City. Wherever possible system redundancy in the form of loop networks has been incorporated in the design for the applicable utility service to prevent or at least minimise supply interruption in the unlikely event of loss of supply.
Figures 9.1 and 9.2 present the typical utility corridor cross sections along the road right of ways in accordance with Azeri utility corridor planning and guidelines, subject to approval by the governing local authority.

Our approach is to place water and electrical services in seperate corridors so that in the event of line breaks there is not damage to other service conduits. The required separation distances are in compliance with international standards and in reference to SNiP standards.

Figure 9.1 Utility Cross Section Location Plan

Figure 9.2 Typical Utility Cross Sections



A1 US/C/8501
TYPICAL SERVICES RESERVATION
CROSS SECTION FOR SIKKA WIDTH OF 10.00m
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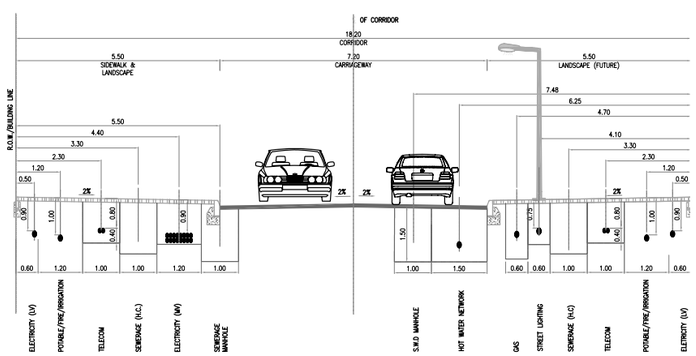

A3 US/C/8501
TYPICAL SERVICES RESERVATION
CROSS SECTION FOR CORRIDOR WIDTH OF 18.20m
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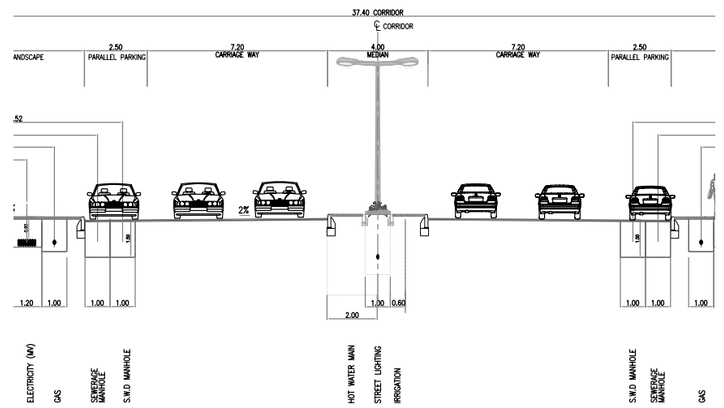

A5 US/C/8501
TYPICAL SERVICES RESERVATION
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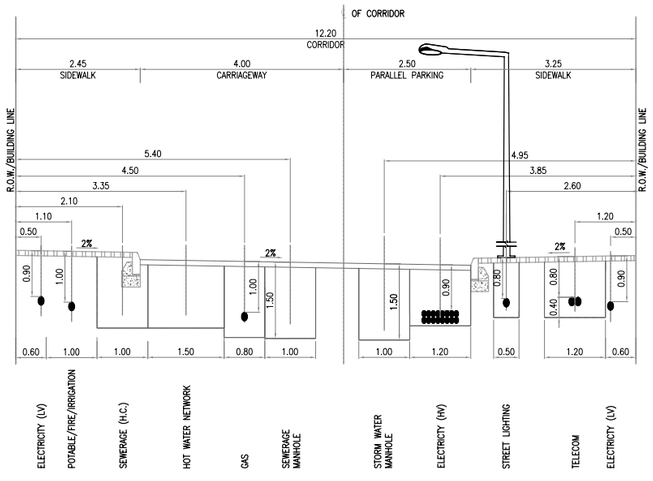
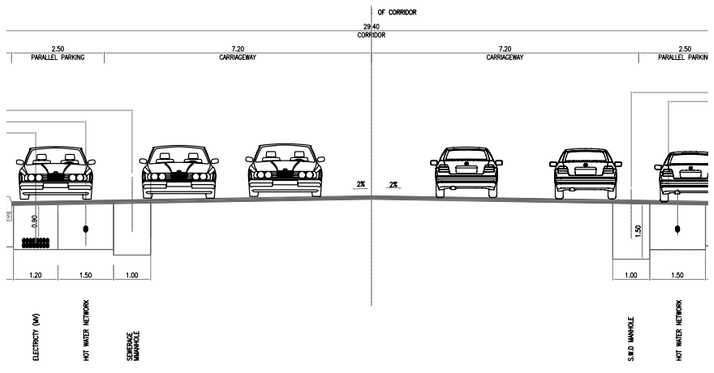
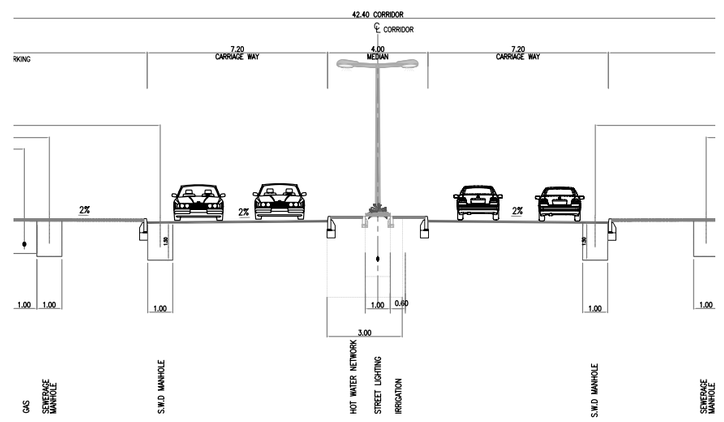


A2 US/C/8501
TYPICAL SERVICES RESERVATION
CROSS SECTION FOR CORRIDOR WIDTH OF 12.20m
SCALE 1:50



A4 US/C/8501
TYPICAL SERVICES RESERVATION
CROSS SECTION FOR CORRIDOR WIDTH OF 29.40m
SCALE 1:50



A6 US/C/8501
TYPICAL SERVICES RESERVATION
CROSS SECTION FOR CORRIDOR WIDTH OF 42.40m
SCALE 1:75

WATER SUPPLY SYSTEM

General

Water supply transmission and distribution is under the auspices of the local water authority (Baku City Water Service). This includes water supply requirements for domestic/potable drinking water, fire fighting water, and for irrigation purposes.

Supply and Connection

The supply will be made available from the water supply mains of the Baku City Water Service along Babek Avenue to an agreed point of termination within the project site. It is assumed that this public supply is available for tapping/connection. System redundancy in the form of a loop network shall be incorporated in the design where applicable.

Design Criteria

The following design criteria are based on assumptions made and subject to confirmation from the Client and subsequent approval by the concerned Statutory Authority. Reference has been made to internationally accepted design practices and projects of similar nature and magnitude.

Domestic Water Consumption Rates

Domestic water consumption has been assumed in terms of litres per person per day. Following are the consumption rates adopted for Black City:

Table 9.1 Potable Water Consumption Rates

BUILDING USE	CONSUMPTION RATE
Residential	350 litres/person/day
Hotels	400 litres/person/day
Employees/Retail/Workers/Office	60 litres/person/day
Visitors	40 litres/person/day

Demand Variation

The demand variations allowed for the proposed development have been assumed for the concept domestic potable water system design:

- Average Day Demand (ADD) - Served Population x Consumption Rate
- Peak Hour Demand (PHD) - 200% of ADD
- Maximum Day Demand (MDD) - 150% of ADD
- Minimum Hour Demand (MDD) - 40% of ADD

System Pressure

A pressure of 1.5 bar will be adopted as a minimum delivery pressure to ensure water supply to the ground level or underground holding tanks for each service area.

Fire flow requirements will be set at 1500 gpm (5700 l/min) at a pressure and duration of 1.5 bar for 2 hours, respectively.

Velocity and Headloss

The pipelines are designed based on the velocity of water not exceeding 2.0 m/s. However, in special circumstances, velocities up to 3.5m/s may be acceptable in accordance with BS EN 805. Maximum unit head loss in pipes considered in the design shall not exceed 10 m/km.

Pipe Material

Transmission and distribution mains shall be of Ductile Iron (DI) pipe material. The pipes shall be properly protected against corrosion and fittings shall be provided with thrust blocks to protect from thrust due to internal water pressure.

Valves

Isolation (Gate and Check Valves), Air Release/ Air Vacuum, Blow-Off (Washed-Out) and Pressure Relief/ Surge Anticipating Valves shall be installed at different strategic points to ensure uninterrupted supply of water.
Air release/air vacuum valves - shall be installed at summit points in the pipelines and at the pumping stations for pump added protection.

Blow-off (wash-out) valves - shall be provided at low points (sag) in the pipelines.

Hydraulic Design

The hydraulic design is based on the Hazen-Williams formula:

$$Q = 0.278\ C\ D^{2.63}\ S^{0.54}$$

Where:

Q	=	Flow rate (m3/s)
C	=	Hazen-Williams coefficient
D	=	Internal pipe diameter (m)
S	=	Slope of energy grade line (m/m)

The hydraulic design for the Black City project will be developed using WaterCAD V8 XM software.

Pipe Cover

A minimum cover of 1.00m above pipe crest will be adopted for pipes with diameter less than 300 mm and a minimum cover of 1.5 m will be adopted for pipes of larger diameter as per requirements. Where it is not possible to provide minimum cover and the pipes are to be exposed to heavy traffic, concrete protection shall be provided.

Population and Water Demand Projections

Population Projections

The current Concept Masterplan presented a total projected population of about 79,000 for the whole development. The total projected number of residents, employees, visitors and workers including the hotel and parks/leisure uses the occupancy rates provided in the development schedule.

Domestic Water Demand Projections

The population rates and assumptions made from the Masterplan were adopted and used in conjunction with the above consumption rates in projecting the domestic water demand. The domestic water demand for Black City was estimated at 31,708 m3/day and an addition of 20% of the total water demand for unaccounted-for water (UFW) thus bringing the total water requirement of the entire development at 38,049 m3/day.

The sitewide population and domestic water demand projections have been based upon floorspace estimates summarized in Table 9.2.

Table 9.2 - Floorspace Estimates used to derive Potable Water Demand Projections

CHARACTER AREA	RESIDENTIAL FLOORSPACE (SQ.M)	COMPARISON RETAIL (SQ.M)	FLEXIBLE COMMERCIAL SPACE (SQ.M)	OFFICE (SQ.M)	TOTAL FLOORSPACE (SQ.M)
Babek Avenue	151,815	67,538	1,081	24,924	245358
Babek Quarter	1,142,814	-	165,712	-	1308526
The CBD	148,855	116,256	-	141,844	406955
Garden City	387,846	-	29,122	-	416968
Central Gardens	432,159	-	61,737	-	493896
Nobel Heights	663,259	-	70,514	-	733773
Total	2,926,748	183,794	328,166	166,768	3,605,476

Irrigation and Fire Fighting Demand Projections

In the absence of the defined landscaping details, the soft landscaping area has been assumed as 20% of the gross land area. The softscape area is typically comprised of open/public spaces and roadside landscape areas.
Until such time as more detailed information becomes available we will proceed on the basis of 15 litres/m2/day irrigation rate to be applied to 20% of gross land area for the estimated irrigation water demand.
Based on the abovementioned assumptions, the estimated total irrigation water demand for the Black City development is 6,630 m3/day, as summarized in Table 9.3 below.

Table 9.3 - Irrigation Water Demand

TOTAL LAND AREA (HA)	ASSUMED LANDSCAPE AREA (HA)	IRRIGATION WATER DEMAND (M3/DAY)
221	44.20	6,630

Fire demand in accordance with NFPA for the sitewide fire fighting (hydrant) system shall be equal to 2 hours fire fighting requirement with a minimum flow of 95 lps (1500 gpm) per hydrant.

System Design

Water Supply Design Strategy

The scheme developed was to use a loop network. This system will provide proper water balance for every service area, thereby ensuring delivery of water (for potable, irrigation and emergency fire fighting use) and pressure requirements. This will also ensure a continuous supply of water even during periods of repair and maintenance.

Proposed Water Supply System

The water requirement of the system will be provided by Baku City Water Service supply. The supply from this source will flow into the different service areas of the system.

Figure 9.3 shows the proposed potable system layout plan for Black City.

The Black City water supply network will be interconnected with the existing mains via tee-offs at designated termination point. From these interconnections, a series of loop network will be installed along the utility corridor and will end on the Boulevard Avenue where the water supply limit of work for Black City lies.

The irrigation and fire fighting requirements is incorporated into the water supply system and is designed in a manner that is effective, and compatible with the planting scheme, without causing any disturbance to the intended domestic water requirements. The fire fighting tankers of local authority will obtain water for fire fighting through fire hydrants working as filling points. At the start of a fire event the irrigation shall be automatically shut down to totally dedicate the system for fire fighting purposes until the fire is extinguished.

Fire Hydrant System

Fire hydrants will be used to fill the fire fighting tankers/trucks. The following are the hydrants' design criteria:
The discharge through each hydrant is 95 l/s and it is also the proposed fire flow demand to be achieved by providing adequate flow to any fire hydrant. NFPA requires a minimum of 1.4 bars to be provided at the hydrants to fill the fire trucks at a faster rate and to provide a margin of safety.

Hydrant Spacing

Hydrant spacing depends on the type of occupancy and risk factor. For the Black City development a minimum spacing of 120 meters between hydrants have been adopted in accordance with NFPA requirements, subject to approval of the governing authority having jurisdiction of fire and life safety.

Figure 9.3. Water Supply Concept Network Plan

SEWAGE COLLECTION SYSTEM

This section presents the conceptual design of the sewage collection and disposal system proposed for Black City.
The basic objective is to collect all generated sewage flows from facilities/ plots by gravity. When gravity flow is impracticable and pipe covers become too deep, sewage will be pumped through force mains to the sewer trunk mains bordering the property.

Projected Flow and Generation Rates Assumptions

The sewage generation rates adopted for the different types of usage are presented in Table 9.4 based on the assumption that 80% of domestic water consumption ends up as wastewater.

Table 9.4 - Sewage Generation Rates

AREA TYPE	SEWAGE GENERATION RATES
Residential	280 litres/person/day
Employees/Retail/Workers/Office	48 litres/person/day
Visitors	32 litres/person/day
Hotel	320 litres/person/day

Based on the projected population and generation rates, the estimated average daily sewage generation is 30,439 m3/day. The expected generation rates per land use are given in Table 9.5 below.

Table 9.5 - Daily Sewage Generation

CHARACTER AREA	Daily Sewage Generation (m3/day)
Babek Avenue Strip	1,289.77
Babek Quarter	7,464.48
CBD	3,649.54
Garden District	3,034.74
Central Gardens	2,378.26
Nobel Heights	2,862.65
Waterfront West	2,166.98
Shopping Centre	3,750.38
Waterfront East	3,797.94
Nobel Park	44.54
Total	**30,439.29**

Design Criteria

The following design criteria are based on assumptions made and subject to confirmation from the Client and subsequent approval by the concerned Statutory Authority. Reference has been made to internationally accepted design practices and comparable projects previously undertaken.

Peaking Factor

The Babbits Formula has been used to generate the peaking factor (PF) used to calculate maximum design flows in accordance with International standards. The Babbits Formula is a function of the size of population connected to a sewer with the peaking factor increasing as the population decreases.

$PF = \frac{5}{PE^{0.1667}}$ Where PE = connected population in thousand

Hydraulic Design

Sewers must be designed to ensure that they have a capacity in excess of the expected Maximum Daily Flows (MDF). The Average Daily Flow (ADF) is calculated as a multiple of the number of villas connected to a sewer, the number of people per villa and the per capita consumption rate (l/h/d). The Maximum Design Flow within a sewer is the Average Daily Flow increased by a multiplier to take account of the possible peak flows.

Pumping stations have been sized so that the capacity of each station is equal to or greater than the peaking factor that drains (by gravity or pumped system) to each.

Hydraulic design is based on the Colebrook-White formula:

$$V = -2.\sqrt{2.g.D.S}.log\left[\frac{Ks}{3.7.D} + \frac{2.51.v}{D\ \sqrt{2.g.D.S}}\right]$$

where V = velocity in m/sec
g = gravitational acceleration in m/s^2 ,
D = pipe diameter in m
S = hydraulic gradient in m/m
Ks = roughness coefficient in m
v = kinematic viscosity of fluid in m^2/sec

Force main head losses will be calculated with the use of Hazen- Williams's formula:

$$Q = 0.278 \times C \times D^{2.63} \times S^{0.54}$$

where Q = flow in m^3/sec
C = coefficient
D = pipe diameter in m
S = slope of energy grade line

Depth of Flow

The design criteria for depth of flow in sewer lines are presented in Table 9.6. Sanitary sewers should be checked for percentage full at all times.

Table 9.6 - Maximum pipe percentage full in sewer pipes

DESCRIPTION	MAXIMUM D/D	MINIMUM D/D
Trunk sewer lines	0.75	0.50
Main and lateral sewer lines	0.85	0.50

Minimum and Maximum Sewage Flow Velocities

Design flow velocities shall be within the limits presented in Table 9.7. Minimum velocities are based on providing self-cleansing velocities and preventing solid sedimentation in the sewer pipes. Maximum velocities are set to prevent pipe scouring and minimize turbulent flows which can result in the release of gases in the sewer system.

Table 9.7 - Maximum and Minimum Velocities in Sewers

PIPE DESCRIPTION	MINIMUM (M/S)	Maximum (m/s)	DESIGN (M/S)
Gravity line	0.6	2.5	0.75
Pressure line	1.0	3.0	1.5

Pipe Sizes and Materials

The minimum pipe size of the sewer system will be 200mm diameter. Pipe materials will conform to the BS specifications and will be of either uPVC or GRP pipe material as designated below:

- uPVC for pipes 315mm or less
- GRP for pipes above 315mm

House connections shall be constructed using uPVC pipes with a minimum nominal diameter of 150 mm.

Pipe Depth

A minimum cover depth of 1.2m above the crown of the sewer pipe must be maintained in order to provide protection from external loads. If it is not possible to provide the required cover due to site constraints, the pipe shall be provided with concrete protection.

Pipe Gradients

Pipe gradients, often the same as the hydraulic gradient, directly influence sewer pipe capacity. In order to achieve the required minimum velocity in sewer lines, pipes shall be designed by observing the minimum gradients listed in Table 9.8.

Table 9.8 - Minimum Sewer Line Gradients

SEWER DIAMETER (MM)	MINIMUM GRADIENTS (MM/M)
200	5.00
250	3.70
315	2.70
400	2.00
500	1.50
600	1.20

Utility Crossings

The following clearances shall be observed when a sewer line crosses or runs near another utility:

- Vertical Clearance – 40 cm minimum
  If less than 40cm, use concrete saddle
  Carry encasement to the first joint on each side of crossing.
- Horizontal Clearance – 1.5 m minimum
  If in same trench, palace other utility on separate bench on undisturbed soil above the sewer line

Proposed Sewer System

The conceptual design of the proposed sewer system was completed by taking into consideration the following guidelines/ assumptions:

- Gravity sewers and manholes will be designed to minimize infiltration which would affect the water quality.
- Follow the road network and use the shortest possible route towards the existing sewer trunk mains.
- Maximize use of available surface gradient to minimize the depth of gravity pipes and manholes.
- Contingency were provided for pipeline fitting losses.
- There will be no increases in flow during or following rainfall, i.e. the foul system is designed to be separate to the storm system.
- It is assumed that invert levels and flow capacity of the existing sewer trunk mains are sufficient to cater the sewage flow of Black City.

The sewage collection system will be gravity sewer system. There are no sewer lift stations for the Project and discharge is by tapping to existing sewer trunk mains. This however, shall depend on the information of groundwater table levels and invert levels to be provided by the Client. Figure 9.4 Shows the Conceptual Design Sewer Layout for the Black City.

Figure 9.4. Sewerage Concept Network Plan

STORMWATER DRAINAGE SYSTEM

This section covers the conceptual design of the stormwater drainage system for the Black City development. The system will collect generated runoff volumes and will consist of curb inlets, gullies or combined inlets, pipes with associated manholes and, if necessary, lift stations.

Design Criteria

The criteria used in the design of the storm water collection facilities for the project are based on assumptions made by the consultant and subject to approval by the Statutory Authority.

Clear Times

Clearance time refers to the length of time after a storm event ends required to remove storm water volumes from service areas. To provide an economical drainage design, large paved areas provide surface water storage to attenuate peak storm flows. Storage may be provided by car parks, service areas, etc., but the clearance time should be generally limited to 4 hours. This clearance time is used to compute peak runoff for sizing drainage pipes.

Runoff Flow and Volume

Peak flow is estimated by using the Rational Method formula:

$$Q = 240\ CIA$$

where
- Q peak runoff rate, m3/day
- C runoff coefficient, dimensionless
- I rainfall intensity, mm/hr
- A catchments area, ha

Minimum and Maximum Drainage Flow Velocities

Design flow velocities will be within the limits which are set in Table 9.9. Minimum velocities are based on providing self-cleansing velocities and prevent solid sedimentation in the drainage pipes. Maximum velocities are set to minimize the negative effects of abrasion on the pipes and manholes.

Table 9.9. - Maximum and Minimum Velocities in Drainage Pipes

PIPE DESCRIPTION	MINIMUM (M/S)	MAXIMUM (M/S)	DESIGN (M/S)
Gravity line	0.75	2.5	0.75
Pressure line	1.0	3.0	1.0

Hydraulic Design

Hydraulic design, like the sewerage system, is based on the Colebrook-White formula.

$$V = -2.\sqrt{2.g.D.S}.log\left[\frac{Ks}{3.7.D}+\frac{2.51.v}{D\ \sqrt{2.g.D.S}}\right]$$

where
- V velocity in m/s
- g gravitational acceleration in m/s2
- D pipe internal diameter in m
- S hydraulic gradient in m/m
- Ks roughness coefficient in m
- v kinematic viscosity of fluid in m2/s

Pipe Material and Size

Pipe diameters may range from 150 mm to 600 mm depending on the catchment area. Drainage pipes should be of either unplasticised Polyvinyl Chloride (uPVC) or Glass Reinforced Plastic (GRP) as designated below:

- uPVC for pipes 315mm or less
- GRP for pipes above 315mm

Runoff coefficients

Runoff coefficients are used with the design storms to estimate storm water runoff volumes. These coefficients are established on a site-specific basis to reflect actual catchment characteristics. The ground area has a runoff coefficient, which varies depending on the level of impermeability. The following coefficients have been assumed.

- Plots 0.5
- Carriage way 1.0
- Footpath 0.6

Pipe Cover

A minimum cover depth of 1.2m above the crown of the drainage pipe must be maintained in order to provide protection from external loads. If circumstances required installation of a pipe with depth less than 1.2m above the crown, then concrete protection will be required.

The recommended maximum cover for drainage pipes is approximately 10m. Depths greater than 10m will be avoided where applicable.

Gully Spacing

Kerb inlet gullies will be used in the drainage system to intercept runoff. The gullies will be spaced as follows:

- Along dual 3-lane road: 20 m
- Along dual 2-lane road: 25 m

Manholes

Manholes in the drainage system will be installed in accordance with the following design criteria:

- Maximum spacing: 100 m
- Minimum manhole lower shaft diameter: 800 mm
- Maximum manhole lower shaft diameter: 1400 mm

Proposed Stormwater Drainage System

The stormwater drainage collection network will be designed by dividing the project site into several catchments in order to minimize the sizes of pipes and the need for lift stations. The general drainage pattern will be established and catchment areas will be delineated. The proposed storm water system for the Black City is based on hydraulic analysis which considers the topography, geographic location and requirements of Local Authorities. Figure 9.5. presents the conceptual drainage network plan for the Black City development.

The main components of the proposed stormwater system are as follows:

- Gullies - Road kerb side entry gully collects all storm water runoff from the road, plots and adjacent buildings. Gullies were strategically located at the lower portion of road sections at about 20m to 25m apart. Gullies as per standard shall include basket strainers for maintenance purposes. A 150mm uPVC drain pipeline will convey water from the gullies to the main carrier storm water pipeline or directly to chambers or manholes.
- Carrier pipe networks – Collection pipelines ranging from 200mm – 315mm diameter uPVC and 400mm diameter and above shall be GRP. The size of the carrier pipes were based on peak stormwater flows. These main collection pipelines will transport stormwater to the respective disposal site of each network.
- Manholes – Chambers and Manholes location and quantities were based on road geometrics and standards. Chambers of shallower depth shall be utilized at the starting points of the network for economic reasons. Manholes types are selected based on the criteria on depth and pipe diameter. The depths of manholes are controlled to achieve the required invert levels at the receiving outfalls particularly on sea outfalls.
- Disposal facility – Whenever possible sea disposal is considered as first option and connection to existing trunk main as secondary alternative.

It should be noted that water-flooding problems cannot be solved by trunk stormwater drainage pipes alone. Proper design with adequate capacity, construction and maintenance of drainage pipelines, gullies and outfall on drainage pipes in each area are necessary. In addition to the proposed trunk drainage pipes the following measures are also necessary to reduce the problem of water flooding during heavy rains:

- Periodic cleaning and maintenance of pipes and gullies is essential for the efficient functioning of any drainage network.
- Additional separate drainage system should be provided in adjoining areas not covered in Black City design to alleviate water flooding problems.
- Grades around buildings should be designed to direct the rainwater away from the buildings swiftly into proposed road gullies. About 0.5% ground slopes maintained around buildings to direct surface runoff into internal drainage system can reasonably protect buildings against foundation damage and wet basements.

Figure 9.5. Stormwater Drainage Concept Network Plan

POWER DISTRIBUTION NETWORK

This section describes the power distribution network installations for the Black City development. The described electrical works include Medium Voltage (MV) and Low Voltage (LV) infrastructure works. Voltages stated are indicative only and shall be in accordance to the local electricity authority.

The scope of work includes the following:

- Cable corridor reservations for the 22 kV (or equivalent) cables (MV loops) of the proposed 132 kV (or equivalent) substations within the development;
- Corridor reservations for 22/0.4 kV (or equivalent) network and transformer substations supplying several plots

Applicable Code and Standard

In conjunction with Azeri power statutory authority and GOST/SNiP, design of all electrical systems will be in compliance with the following:

- Latest edition of International Electrotechnical Commission (IEC) 60502 publications including amendments
- IEC 60726 specifications for MV/LV Transformers

Basic Design Criteria

The design criteria to be adhered to for the electrical network concept will be based on the main objectives as summarized below:

- To comply with the applicable codes and standards,
- To meet the specific power requirements of electrical systems and equipment,
- To implement safety measures for the protection and safety of people and equipment.

Power Demand and Distribution Network

General

Incoming power will be brought to the site by local electricity authority to the dedicated 132kV sub-stations and depending on the incoming voltage, will be stepped down through a series of medium voltage (22kV) feeders that will serve the respective transformers located at the appropriate locations on the development. Locating the feeder pillars inside transformers substations will have to be approved by the local electricity authority. The concept power demand load analysis for the Black City will be assessed using estimated power rate figures from projects of similar nature.

Estimated Power Demand

In Concept design, the estimated total connected loads and load profile were initially calculated based on the built up area (BUA) in the concept masterplan area development schedule and the operation of the proposed buildings in the development. A more detailed estimation of demand load shall be carried out in the preliminary and detailed design stages of the project.

Estimated Connected Load

Using the initial rates based on the built up area of each land use, the different demand load figures have been estimated and are presented in Table 9.10.

Table 9.10. – Estimated Connected Loads

LAND USES	BUA (SQ.M.)	CONSUMPTION RATES (SMALL POWER & LIGHTING) W/M²	TOTAL ESTIMATE CONNECTED LOAD, KW
Residential	3,685,226	100	368,523
Retail	330,452	200	66,090
Office	475,631	110	52,319
Hotel	26,720	150	4,008
Infrastructure	-	-	5,000
TOTAL	**4,518,029**		**495,940**

Power Distribution Network

The distribution of power will be made through 22kV cables looping in and out of each 22/0.4 kV substation. The 22kV network reticulation follows an open-ring arrangement to allow for N-1 contingency.

Medium Voltage Distribution (150/22 kV)

Figure 9.6 shows the proposed Medium Voltage network layout. As part of the design, the network reticulation will dictate the entry points of the cable and in turn the location of the substation rooms within the specified locations. The approvals for the sizes and location of the substation rooms shall be in accordance with the local electricity provider/authority.

Low Voltage Distribution (22/0.4 kV)

The 22/0.4 kV substations will either be situated inside the substation rooms of the buildings or within the landscape area. The pocket substations located in the landscape area are intended to feed the infrastructure loads such as streetlights, pedestrian lights, water features, traffic signals, etc. Site wide distribution will be via direct buried cables or cables in ducts routed along the utility corridor. The network will be designed in accordance with the local electricity authority standards. Figure 9.7shows the LV network.

Street Lighting

Design Criteria

The lighting design criteria for the roads will be in accordance with the recommendations of International Commission on Illumination (CIE) No. 115-1995, Recommendations for the Lighting of Roads for Motor and Pedestrian Traffic. Table 9.11. lists the recommended lighting class allowable values for the type of roads specified.

Table 9.11. - Recommended Lighting Class Allowable Values

CLASS	ALL ROADS			ROADS WITH FEW JUNCTIONS
	LAVE	UO	TI	UL
M1	2.0	0.4	10	0.7
M2	1.5	0.4	10	0.7
M3	1.0	0.4	10	0.5
M4	0.75	0.4	15	-
M5	0.5	0.4	15	-

- L_{ave}: Average Luminance
- U_0 : Overall Uniformity
- U_L: Longitudinal Uniformity
- TI: Threshold Increment

Proposed Street Lighting Network

The low voltageLV line for street lighting will connect to a proposed feeder located within the proposed site. The street lights will be spaced at either 30 metres apart at median and 35 metres apart at footpath. Street lighting column spacing are indicative only and will be designed on the next design stage.

The street lighting network will be composed of a series either 2x150 W or 2x250 W of luminance mounted on either 10 meter poles or 12meter poles along the median island. A series of either 1x150 W or 1x250 W of luminance mounted on 10 meter poles around the proposed site to serve the remaining areas. The network shall be subject to confirmation and approval from the local electricity authority.

Figure 9.6 Medium Voltage Electricity Network Concept Plan

Figure 9.7 Low Voltage Electricity Network Concept Plan

TELECOMMUNICATIONS NETWORK

It is anticipated that incoming telecommunications services will be brought to site by the Baku City Telephone Network and distributed from a sitewide Telephone Exchange Station (TES) within the development. The TES shall be a 2-storey building in a 300 sq. metre area.

Telecommunications Containment Network

A single Ethernet based network to be installed across the site as a general transmission medium for all systems has been considered in the concept design. This network will handle the transmission of all communications signals, with each terminal being given its own IP address.

The telecommunications infrastructure requirements are relatively simple. Every building that may require some communications service needs to be provided with a minimum of 2-way duct entry, giving access to the overall duct network in accordance with Baku City Telephone Network guidelines. Figure 9.8 presents the concept telecommunications network for Black City.

Duct Infrastructure

The duct infrastructure includes all underground ducts, access chambers, building entry points and equipment housings for all Communications systems. All services will be distributed underground. A main duct backbone ring will be required around the site (providing a level of diversity in the event of cable/equipment failure), with each building within the development requiring any form of communications connecting into the backbone.

The Black City will house a fully diversified range of facilities and will present an integrated package of services over its commercial, residential and recreational facilities. The design and size of ducts, pathways and manholes of the telecommunications systems should be dimensioned to cater for the ultimate capacity of the Black City, as well as, the technology selected to carry and deliver the required services. Technology and design choices will be optimized to minimize capital cost and short and long term operation cost while maximizing benefits to the users as well as to the network/service providers.

The scope of design of the telecommunications systems utilities is to provide for the necessary duct containment system for the above mentioned outdoor network infrastructure.

Ducts shall be laid in appropriately designed and installed trenches with a minimum of 600mm cover. Marker tape shall be placed over all ducts. Sufficient space for the cables, plus an expansion allowance of 100% shall be allowed for to ensure a 30 year life for the infrastructure.

Chambers shall be installed at every change in the direction of cable and every 200 meters on straight runs.

Cable Infrastructure

The backbone of the network will be a fibre ring around the site, with the nodes connected with standard fibre cable. From the distribution nodes, blown fibre tubing will be installed into each building, leaving the flexibility to install the required type of fibre as services are required.

Design Criteria

All civil works, ducting systems, manholes, etc. will be designed to comply with international standards and local operators i.e. local provider regulations, guideline, requirements and general practice.

Figure 9.8 Telecommunications Network Plan.

GAS AND DISTRICT HEATING

Two centralized heating and natural gas systems for the Black City development have been allowed for in the utilities corridor, pending decision by ADEC on what level of gas supply is to be provided to the residents and gas consumers within the Black City development. At this point in time, an indication of the space allocated for these two systems is included on our drawings. Standard utility clearances and cover depth in accordance with SNiP were incorporated in the drawings.

As soon as the Client makes the decision on which level of gas service should be provided to the consumers within Black City then the reticulation system can be designed.

CONCLUSION AND RECOMMENDATION

The development of the concept designs for each of the utility elements have been based primarily on the Master Plan and on available information provided by the Client. In addition, the assumptions and design features adopted are based on internationally accepted standards and comparable projects undertaken by Atkins.

A review of the Masterplan indicated issues that will require further confirmation and agreement with the ADEC and the relevant statutory authorities prior to moving forward with the detailed design. Modifications as desired by ADEC and the authorities will also be incorporated further during the course of the design process.

The work to date has covered the initial designs for a number of infrastructure systems. The recommended modification/ options including the construction phasing of the services will be finalized after confirmation and approval from the Client and the relevant Statutory Authorities.

The recommended scheme for the respective utility services shall be presented to ADEC for review and approval, and shall be taken forward in the next design stages of the project. Further investigation, modelling and calculations are required to firm up the design (sizes, capacity, etc.) for each utility service and come up with an integrated infrastructure system capable of servicing the proposed development. Further recommendations for the project's sustainability will also be undertaken by advising on the choice of construction materials and landscaping elements such as those that have a low embodied energy, have a high degree of recycled content, are sustainably sourced, and do not contain substances detrimental to either health or environment.

Coordination with all relevant Statutory Authorities and service providers should be carried out to ensure that their requirements and associated guidelines are complied with and previous comments are well incorporated in the approved Concept Design. Further modifications (if any) as agreed between the parties shall be addressed in the next design phases of the development.

10. THE GARDEN DISTRICT: MASTER PLAN AND DESIGN GUIDELINES

INTRODUCTION

This section provides a detailed master plan and design guidelines for the development of the 24 hectare Garden District area of Black City, which will be the very first phase of development.

The master plan and design guidelines will be the device through which ADEC will maintain control over the development of Black City, when it comes to the implementation of the first phase. In effect, the plan and guidelines set out the 'rules' that must be followed by the multiple developers of the first phase of Black City, in order that the individual projects that come forward fit like a jigsaw piece into the overall master plan. The document will become the first of a family of similar documents; one for each development phase.

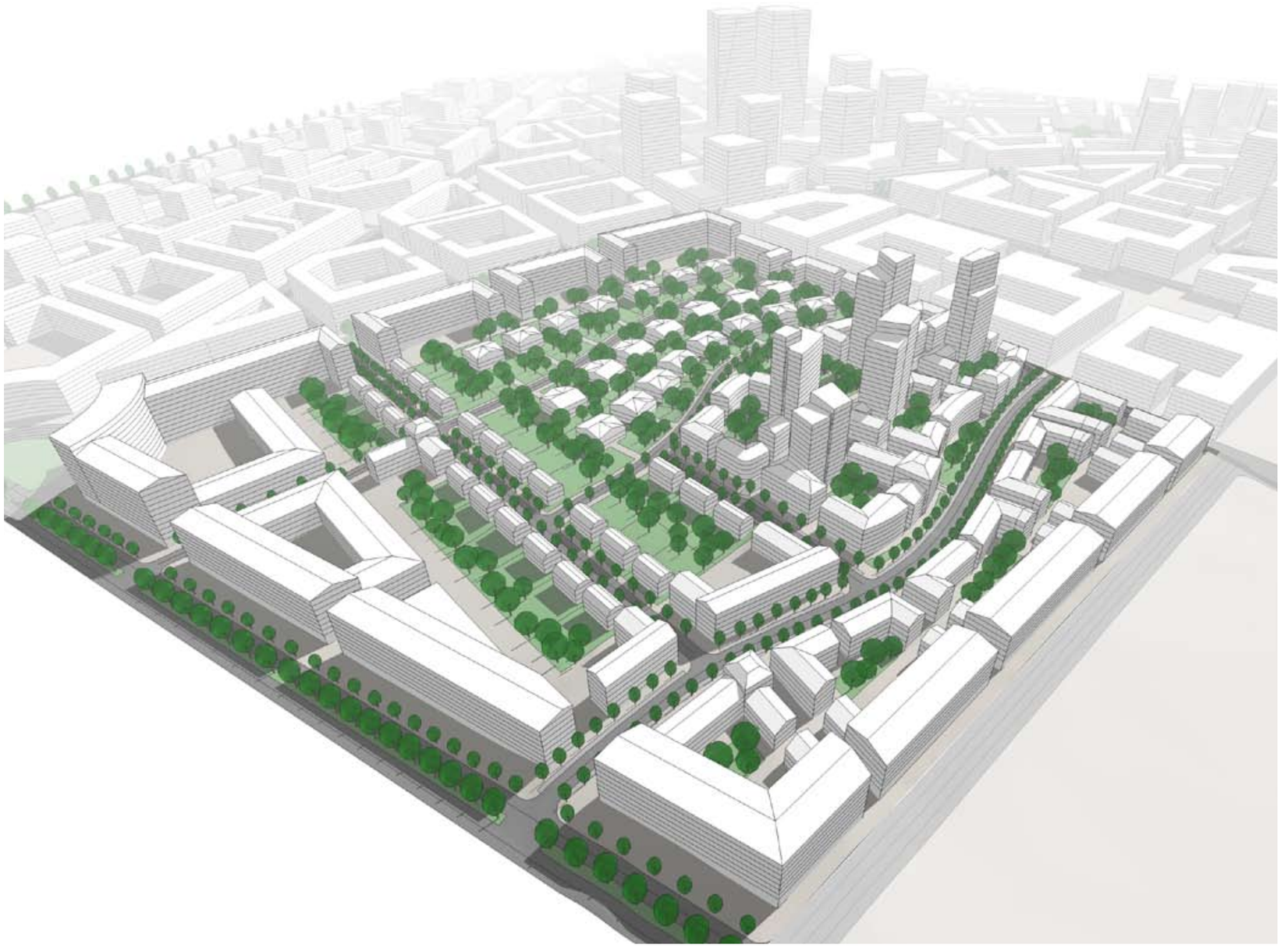
Contained in this section is;

1. an illustrative master plan for the design of the Garden District,
2. a set of accompanying design guidelines.

The illustrated master plan sets out a physical vision for the Garden District, along with a detailed rationale for its planning and design. The master plan is not intended as an architecturally accurate 'blueprint' of the future development. Neither is it concerned with matters of architectural style. Its role is to explain key layers of information about the planning of the Garden District, such as the street hierarchy and circulation strategy, links to the surrounding area, building types and heights, land use and development quantum, building orientation and access, plot boundaries, and the location of key public spaces. It also provides information as to the intended character of district through precedent images, sketches and other visual material.

The design guidelines provide more technical information about details of the master plan, using plans, sections, photographs and other visual material. They include specific requirements for building types, building location and orientation, access and parking, and the organisation of streets and spaces.

Figure 10.1 Phase 1A: The Garden District



THE GARDEN DISTRICT

The Garden District is located at the western boundary of Black City, close to the existing built up area of Baku. The undeveloped Garden District site is xx hectares in total surface area. The site contains part of the main ridge line that runs through Black City.

The Garden District will be characterised by a very high quality, residential environment. More than any other district in Black City, greenery will be the predominating feature. Elegant tree-lined streets and avenues will be matched with rich maturing trees and shrubs set in private and shared gardens and public parks.

Central Avenue - the most characteristic and high-profile new shopping street in Black City - will run directly to the north of the district, circumscribing its northern boundary. The western edge to the city is defined by Khangani Rustanov Street, which will be upgraded to form a primary north – south road link. Coupled with this will be one of the main new junctions in Black City, which will be located at the north-west corner of the site.

The district will contain a small amount of commercial floor space along these main arteries. It is likely that the land uses here will be retail at ground floor with offices and/or residential above. Overall though, it will be a primarily residential district, with immediate links to the city of Baku to the west, the Central Gardens to the east and CBD to the north east.

The district will be made up of a rich green landscape of tree-lined residential streets and parks, punctuated by a variety of building forms; from tall, elegant residential towers, to medium-rise apartment blocks, to low-slung villas and mansions. The Garden District will contain four main types of residential development:

- High rise apartments, which make best use of the topography of the site to create wide and often uninterrupted views of the Caspian Sea.
- Embassy houses; large, three storey detached dwellings laid out in a formal manner along a regular and easily accessible tree-lined street.
- Villas, located at the tranquil heart of the district, which will provide very large family accommodation with a great deal of privacy from the street.
- Urban apartments, which will be close to the residential towers, and arranged around private shared gardens. In addition, some urban apartments will be located directly on Black City Avenue and Khangani Rustanov Street.

The Garden District contains a great deal of private green space for those living in the villas, embassy houses and medium-rise apartments. In addition, there will be a Central Garden for the amenity of all local residents, but particularly for those living in the residential towers.

Figure 10.2 Phase 1A: The Garden District

Table 10.1 Phase 1A: Development Specifications

GARDEN CITY SOUTH (PHASE 1A) STATS		
Total Site Area (Ha)	24	
	FLOORSPACE	NO. UNITS
Total Gross Residential Floor Area	387,846	2,083
OF WHICH:		
Villas	26,400	22
Embassy Houses	11,880	22
High Rise Apartments	46,603	272
Medium Rise Apartments	302,963	1,767
Residential Density (GFA per ha)	18,876	
Total Gross Commercial Floor Area	29,122	
Commercial Density (GFA per ha)	1,417	
FAR	2.03	
ADDITIONAL INFO:		
Residential Density (dwellings per ha)	101.4	
Gross Floorspace per developable ha	21,938	
Estimated Population	6,876	
Estimated Employment	466	
Net Residential Floorspace	271,492	
Net Commercial Floorspace	23,298	
PARKING:		
High rise residential (spaces per dwelling)	1.5	
Medium rise residential (spaces per dwelling)	1	
Low rise residential (spaces per dwelling)	2	
Commercial	TBC	

Character images of the garden district

THE GARDEN DISTRICT MASTER PLAN

The plans and illustrations that follow explain the detailed illustrative master plan for the Garden District.

Figure 10.3 Phase 1A: The Garden District Master Plan

Street scene sketches (drafts in development)

1

2

3

4

MASTER PLAN RATIONALE

The following plans and sections explain the rationale behind the design of the Garden District master plan.

Movement, Access and Parking

A primary and secondary avenue define the Garden District to the north and west respectively. There are several points of access into the district from these two arterial routes. A tertiary avenue runs to the south, which due to the topography of the site allows building access only for vehicles and pedestrian access north, up the incline and into the site.

Within the district, a grid pattern of green neighbourhood streets provides access to individual buildings and development blocks. One of the streets remains private, which will create a highly desirable street of villas at the centre of the district, within close reach of the Central Gardens, CBD and Central Avenue. Pedestrian controlled streets are provided in instances where topography rules out a vehicular route; in these streets, ramps and steps would be provided to master the incline.

A variety of parking solutions are accommodated. In the steepest areas of the site, basement parking can be provided as part of ground work for building foundations (see sections below). Above the basement car parks would be landscape gardens. Parking for individual detached dwellings would be provided on-plot. At the rear of the other apartment blocks, surface parking would be provided along with service areas. All vehicular streets accommodate on-street parking.

Figure 10.4 Movement, Access and Parking

Land use

As well as purely residential uses, the Garden District contains mixed use buildings. These would have flexible ground floor accommodation, which would be used mainly for local commercial activity, such as shops and other services. Offices might also be accommodated at lower levels. These are located along the main arterial routes and at the centre of the district.

Figure 10.5 Land Use

Landscape and Open Spaces

The Garden District contains rich landscape and a variety of public and private open spaces. Most of the main streets contain avenue tree planting. Where this is not the case, the front gardens of detached houses would be encouraged to contain trees and shrubs. At the centre of the perimeter blocks of apartment buildings are private shared gardens. A central public garden provides a large open green space which is available for the whole community to enjoy.

Figure 10.6 Landscape and Open Spaces

Urban Form

The plan shows the key aspects of the physical design of the master plan. Several buildings have key frontage lines; these are frontages that are crucial to defining the more formal public streets and spaces. Landmark towers have been located where the natural topography of the site already creates elevation. The towers benefit from the prospect of wide views of the Caspian Sea; either uninterrupted, or filtered through other towers. The topography of the site also assists in providing basement parking (see sections below).

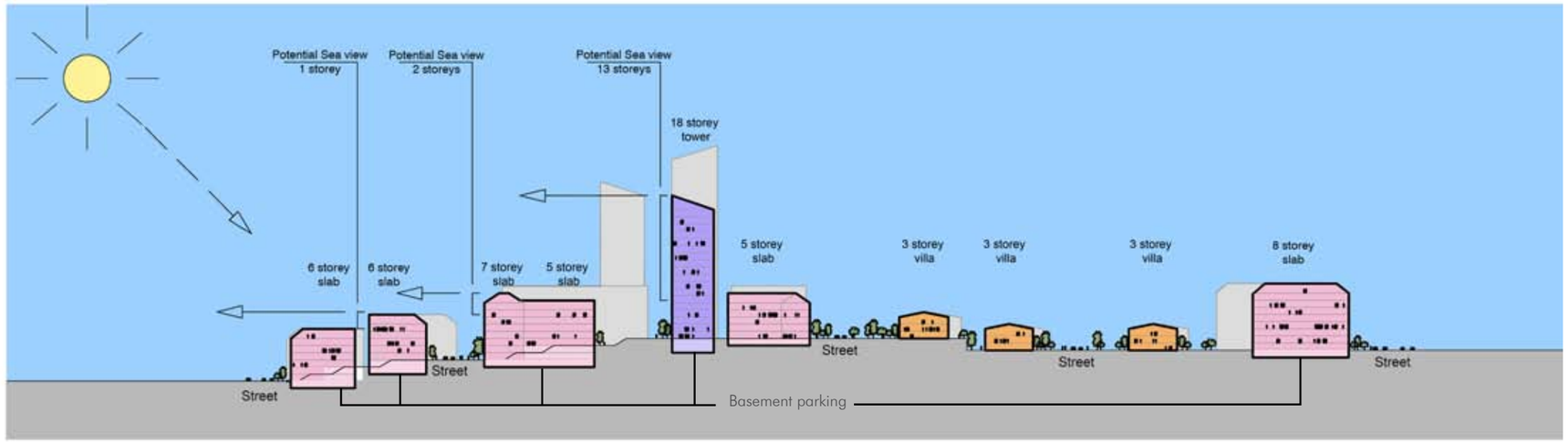
Several key sightlines in the district are picked up by marker buildings. These would be elevated slightly from adjacent building lines, and in combination with the sightlines make for a highly legible and distinctive street scene. Lower rise buildings have been located in the 'bowl' of the site.

Figure 10.7 Urban Form

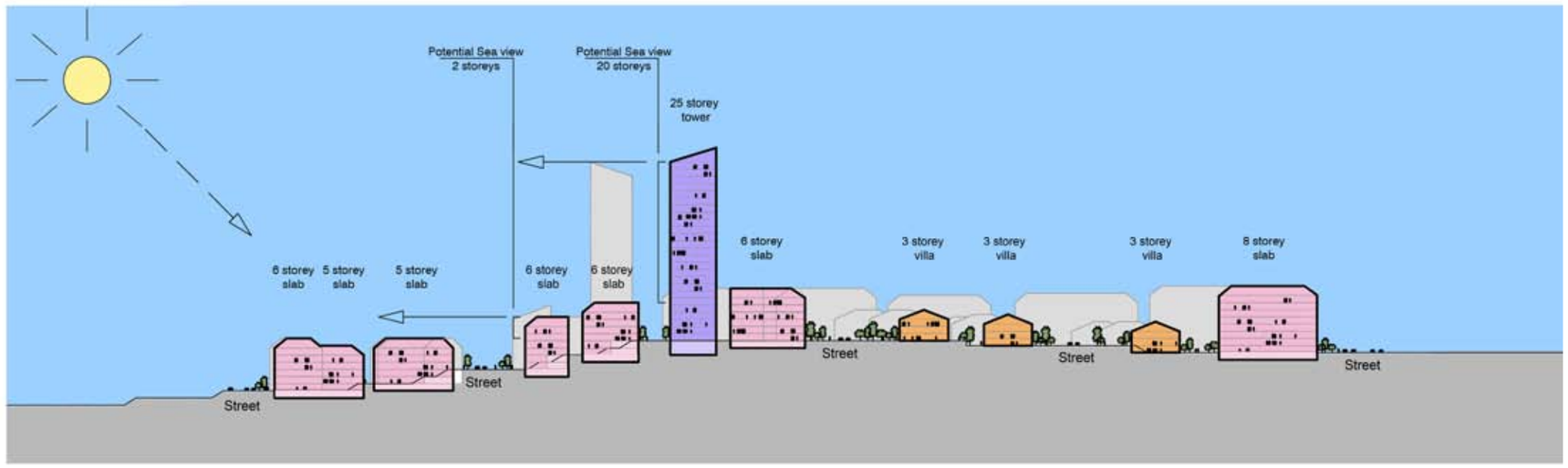
The sections to the right illustrate how the higher buildings have been located to maximise sea views, and how the topography assist in providing basement parking.

South

North



A



B

DESIGN GUIDELINES

The design guidelines for the Garden District contain the following:

- A regulating plan, which sets out the key criteria for building location, orientation, and height, as well as the location of certain street and building types.
- A set of street sections, which relate to the regulating plan, and also to the street sections set out in section XXX of this document.
- A set of building typologies, which also relate to the regulating plan.
- Supporting photographic examples.

Regulating Plan

Storey height

The specified range of storey heights allowed for a given building frontage. Storey heights in particular locations are specified in order to maintain the clarity and structure of the street hierarchy, particularly in terms of the ratio of building height to street width.

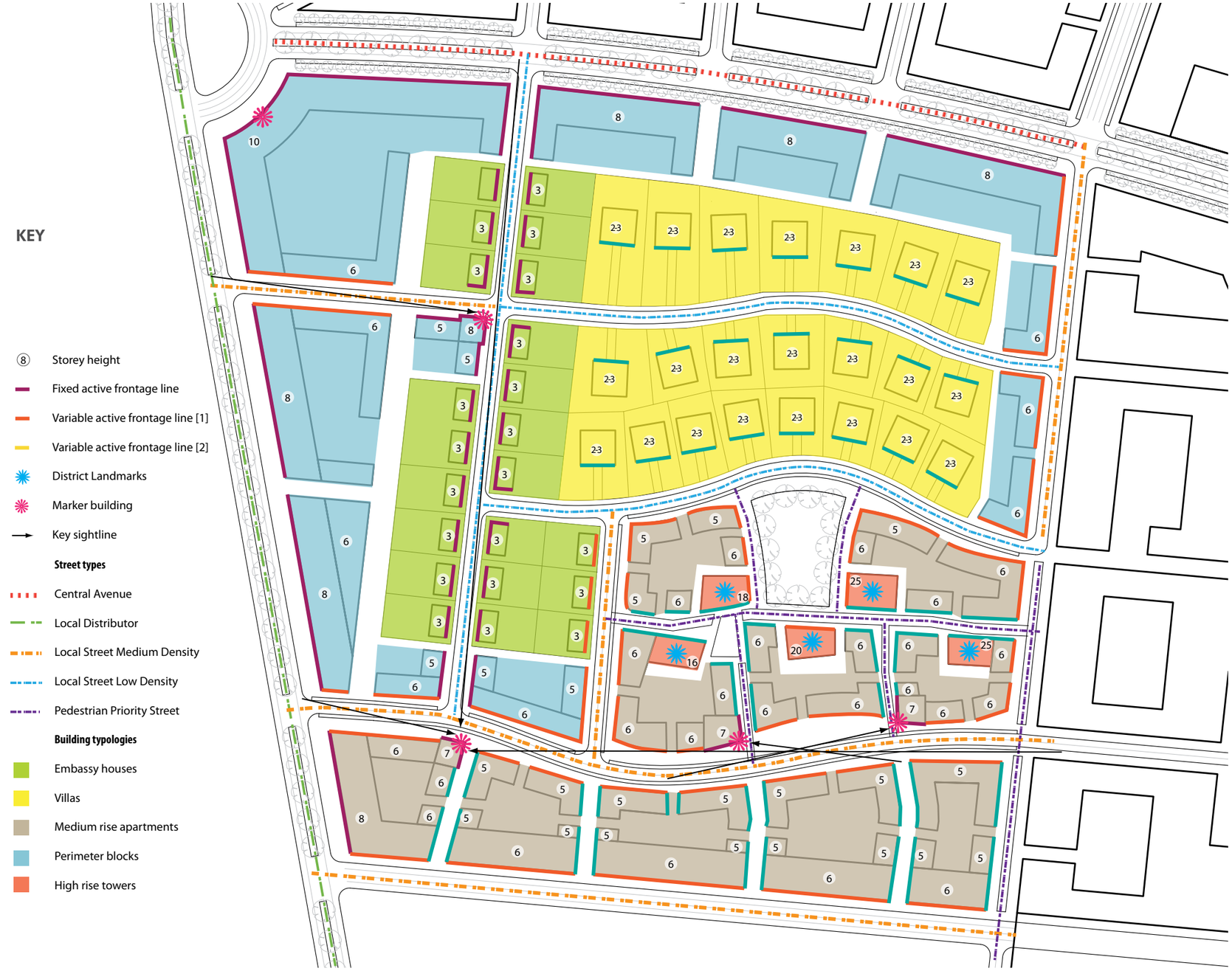
Fixed active frontage line

Fixed active frontages are located along the most formal streets, and those that are higher up in the overall street hierarchy. In these locations the building line shown on the plan is fixed, to achieve strength and formality in the street scene. Buildings will create a continuous active façade to the street. Fenestration, building entrances, balconies and terraces are encouraged.

Variable active frontage line [1]

Variable frontages are located in less formal streets and those lower down the hierarchy. In the first category, the building line may step back up to 3m from the specified frontage line for up to 50% of its overall length. Buildings will achieve a continuous active façade to the street. Fenestration, building entrances, balconies and terraces are encouraged.

Figure 10.8 Regulating Plan



Variable active frontage line [2]

In the second category – appropriate in the least formal streets - the building line may step back up to 3m from the specified frontage line for up to 80% of its overall length. Buildings will achieve a continuous active façade to the street. Fenestration, building entrances, balconies and terraces are encouraged.

District Landmarks

Buildings defined as district landmarks are visual markers on the city scale. They are crucial to creating a district that is dramatic, stimulating, and clear and simple to navigate. District landmarks should use height, scale, projection and architectural detail as devices which respond to both key sightlines around the site, and to wider visual links in the city, to occupy a prominent place in the overall image of the city. Such devices may mean a departure from the above codes for frontages in those specific locations. At street level however, landmark buildings must still be shown to create a continually active façade to the public realm.

Marker building

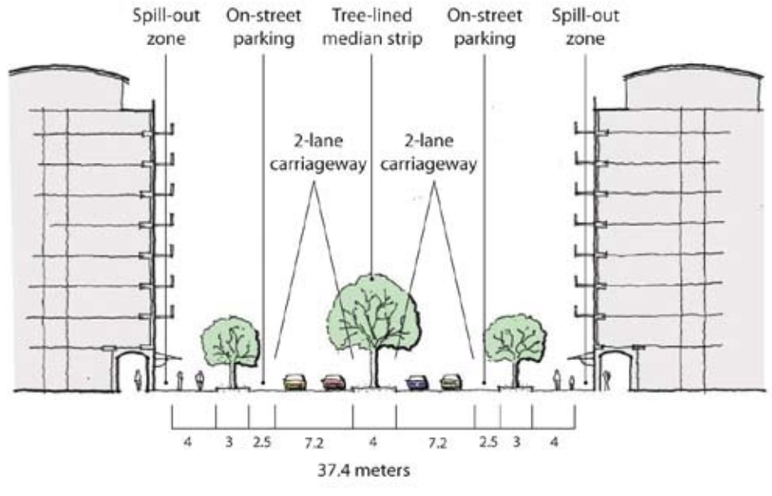
Marker buildings are in visually significant locations within the masterplan; such as at gateways to the district, or where a series of important sightlines converge. In these locations, the design of the building façade will need to respond positively to these conditions.

Key sightline

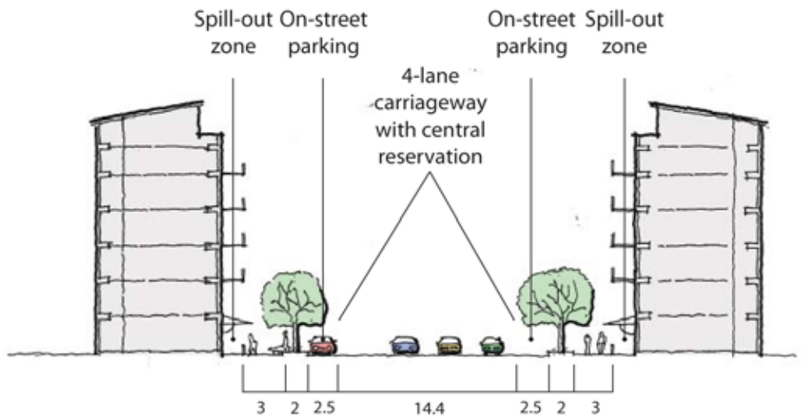
Key sightlines to marker buildings should be protected and enhanced wherever possible.

Figure 10.9 Street Sections

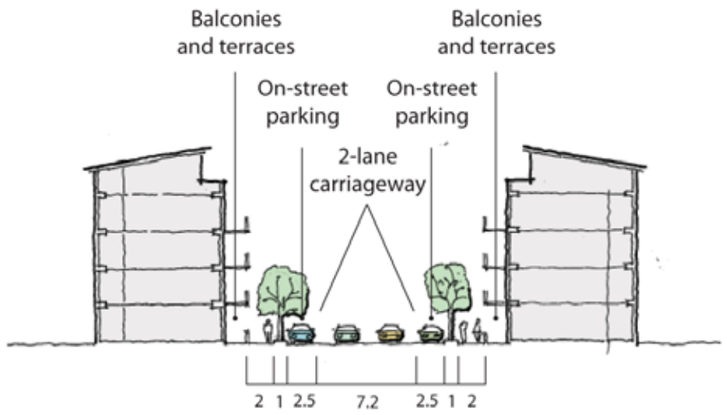
Central Avenue



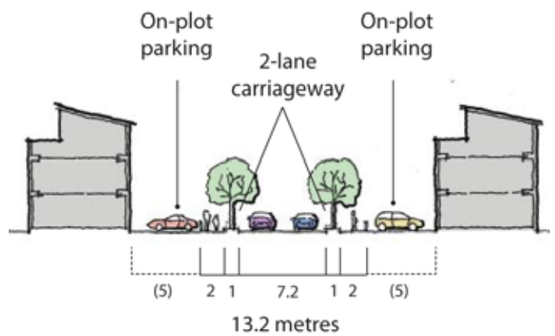
Local Distributor



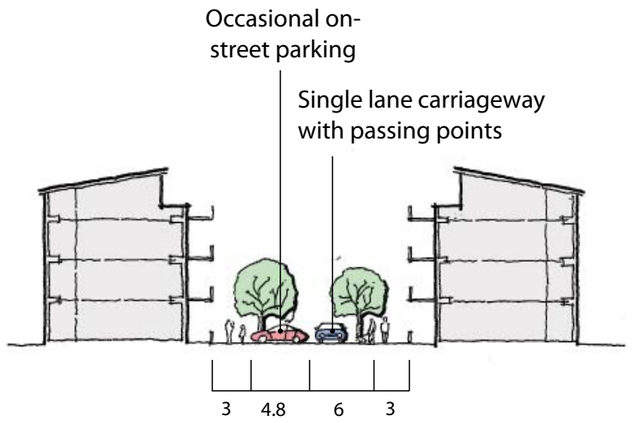
Local Street Medium Density



Local Street Low Density

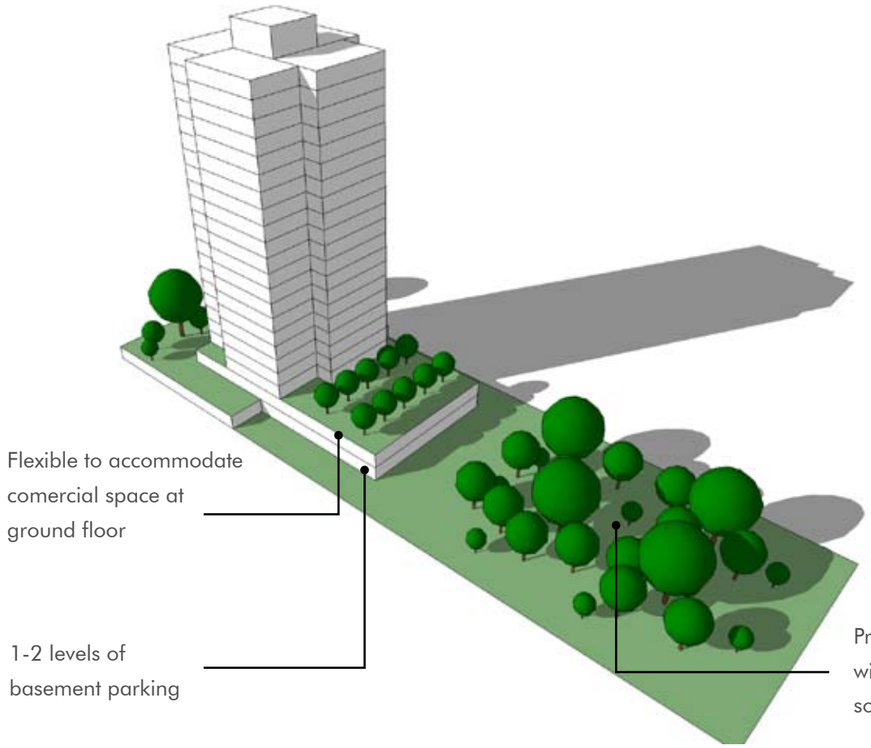


Pedestrian Priority Street

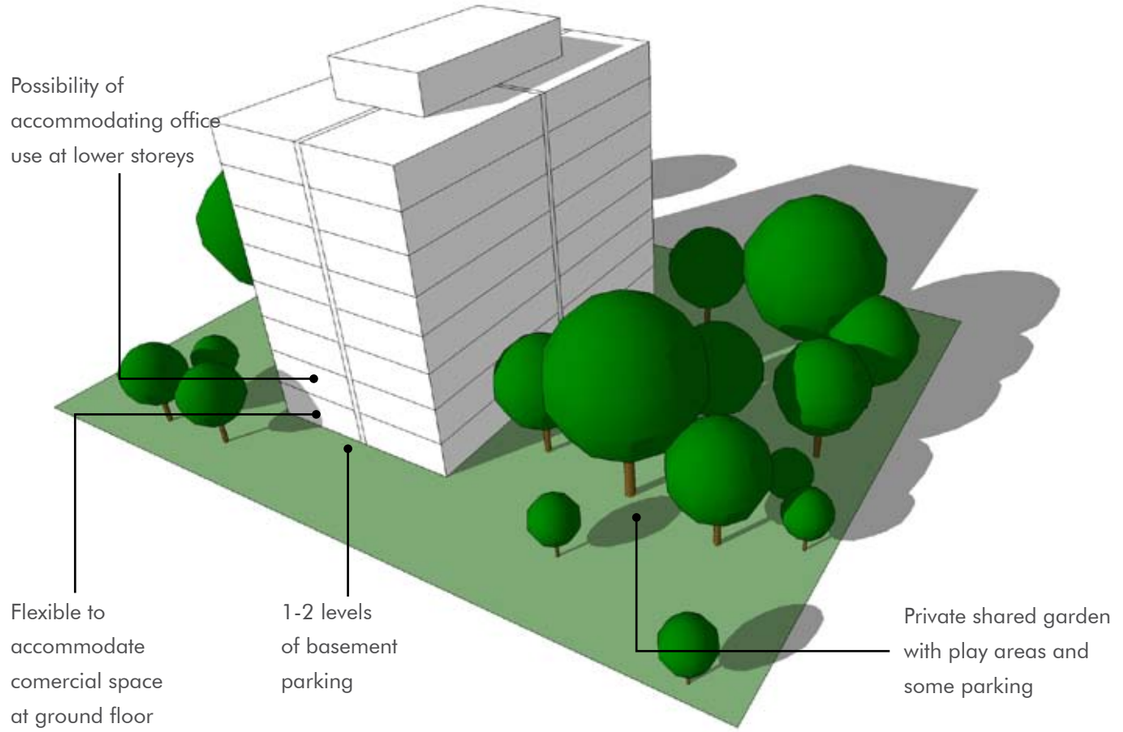


BUILDING TYPOLOGIES

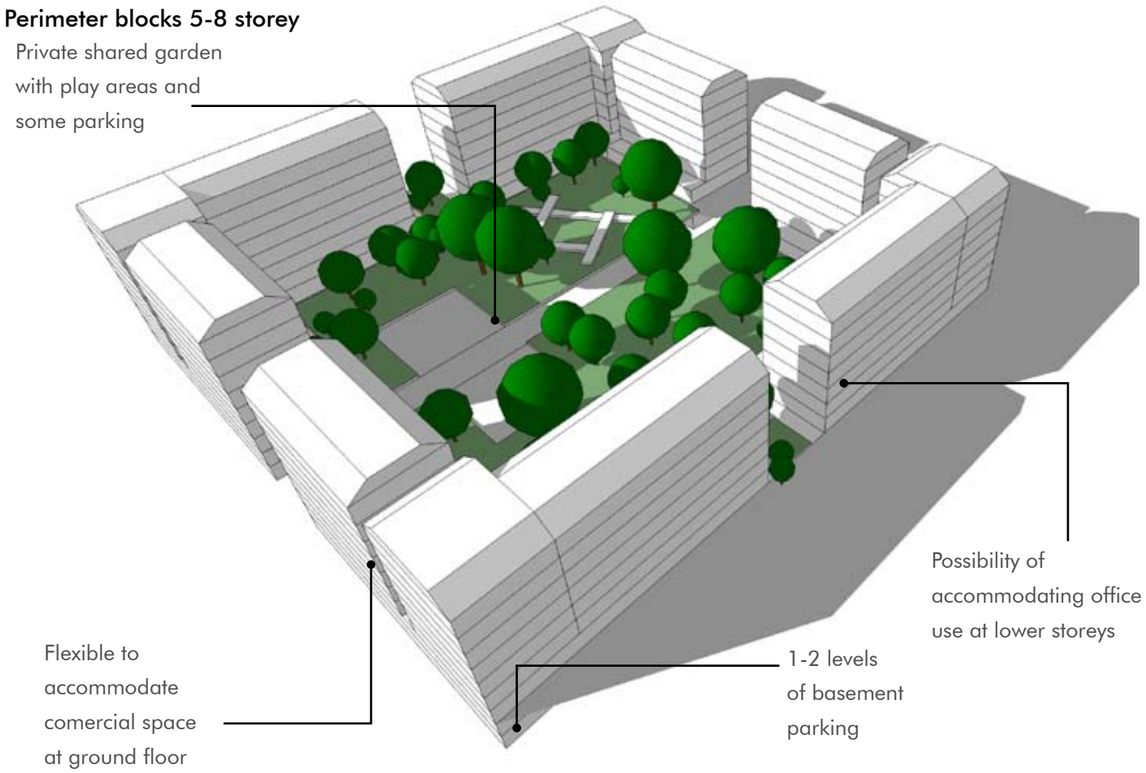
High rise appartments 18-25 storey



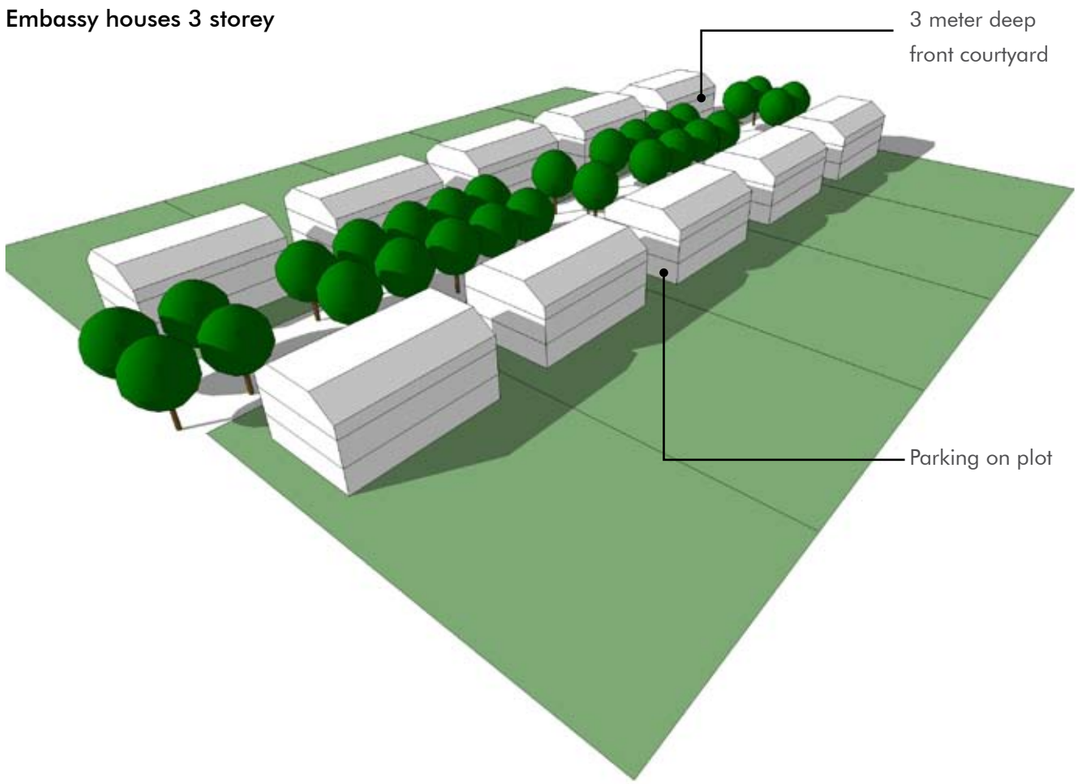
Medium rise appartments 5-8 storey



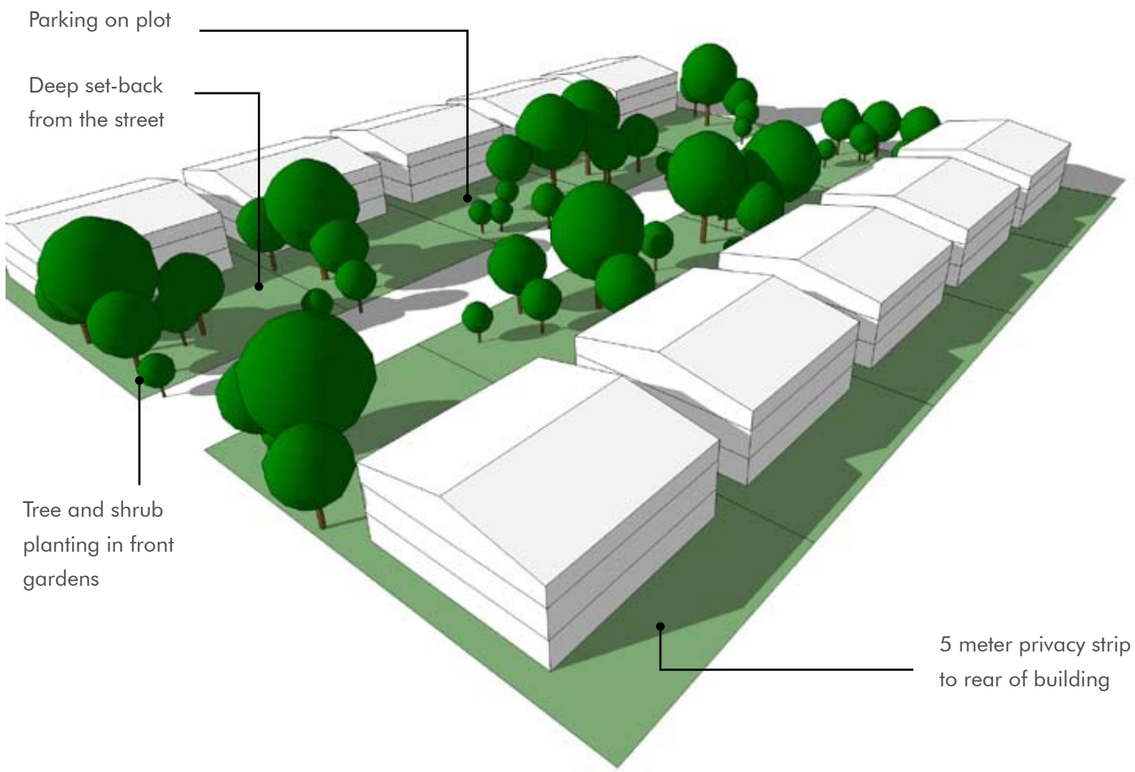
Perimeter blocks 5-8 storey



Embassy houses 3 storey



Villas 2 storey



11. NEXT STEPS

This document sets out the full concept masterplan, including a framework for urban design, movement, open space and utilities, as well as a more detailed masterplan for the Phase 1a area, which includes detailed urban design, plot layout and building typology analysis.

Figure 11.1 illustrates the master planning programme, with this report forming the deliverable at Task 2.6. The detailed design exercise for Phase 1a also represents the Stage 3 report for this area. There are a number of tasks that will need to be undertaken in order to develop the remainder of the masterplan to this level of detail, including:

- Confirmation of the overall scale and mix of development within the southern section of the master plan, which is currently being prepared.
- A detailed market analysis to enable further refinement of the overall mix of dwelling types and sizes, potential for leisure and tourism and the mix of floorspace
- A more detailed appraisal of the level of community facilities required within the master plan area, including land requirements and the form of provision required, based upon discussions with government agencies
- Scoping discussions with the local highway authority in order to agree parameters and standards for the Transport Assessment, such as the network coverage to be considered, the period for assessment, the assessment years and junction types, in addition to any potential changes that may be planned for the public transport network
- Further discussions with government agencies to identify the potential impact of other developments in the region, which may be likely to have an impact on trip patterns for the area as a whole.
- A detailed topographical survey of the site in order to identify any potential constraints on development, which may also impact on the proposed phasing of development
- Further environmental investigations, including a land contamination study, in order to identify potential constraints on development

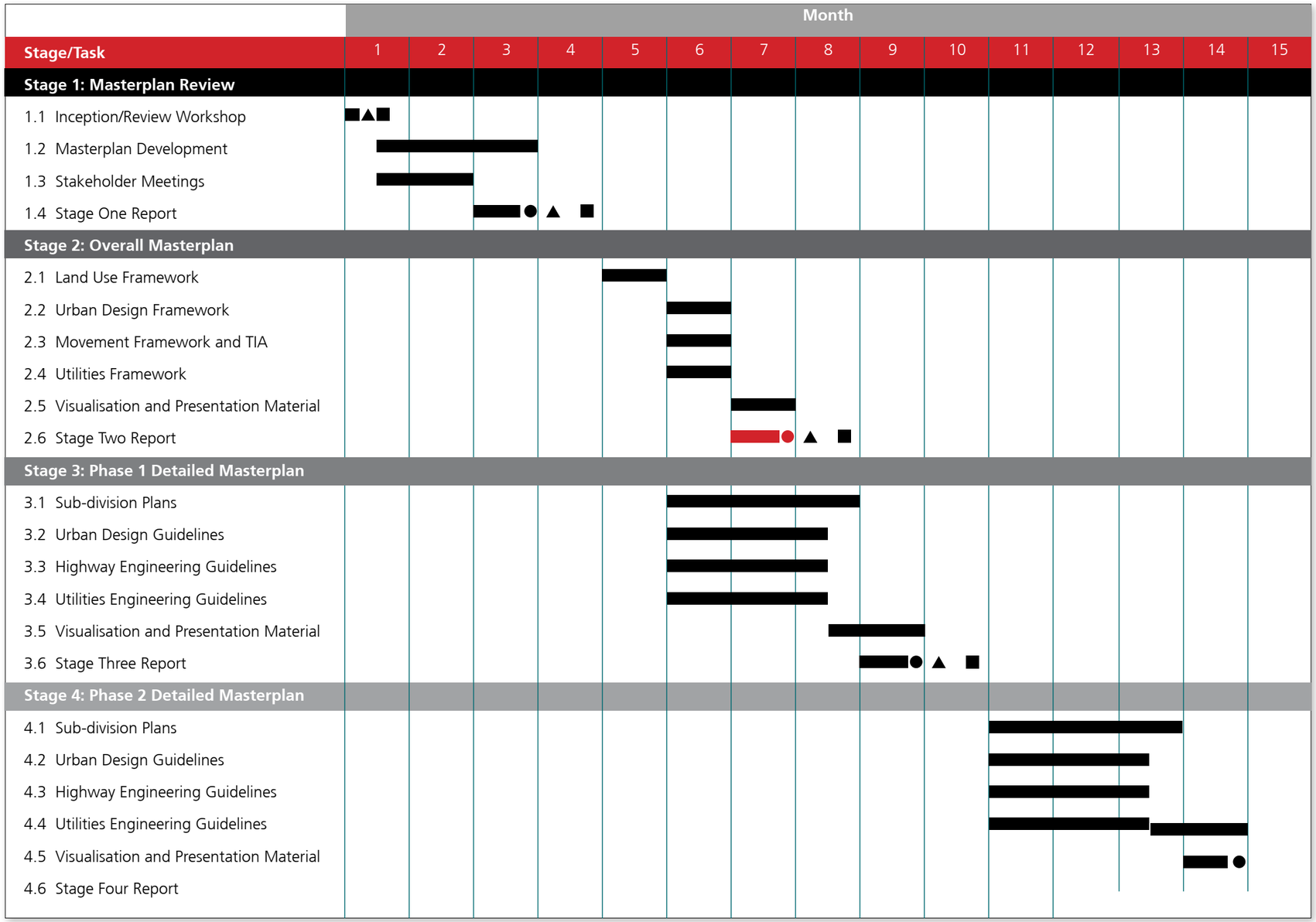


Figure 11.1 Programme