Lefroy Road Quarry
Local Structure Plan
LandCorp + City of Fremantle
October 2011
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1. introduction

This report has been prepared on behalf of LandCorp and the City of Fremantle for the landowners the City of Fremantle, Main Roads Western Australia (MRWA) and the Western Australian Planning Commission (WAPC) in support of a Local Structure Plan (LSP) for the Lefroy Road Quarry site.

The site comprises approximately 10.77ha and is zoned ‘Development’ in the City of Fremantle Local Planning Scheme No.4 (the Scheme). The Scheme requires the preparation and endorsement of a Local Structure Plan for land zoned ‘Development’ prior to subdivision and development. This LSP report addresses the requirements of the Scheme including a description and analysis of the land, details about the development and confirmation that the proposal is consistent with the State’s strategic planning framework and the City of Fremantle’s strategic objectives for this locality.

The LSP is the result of many years of site analysis, design and community engagement. The LSP addresses the major constraints to development arising from former use of the site for landfill, as well as establishing a strategy for the safe and effective remediation of any contamination.
Figure 1 - Contextual Analysis

Commerical
Residential
Public Open Space
Public Transport
400m Pedshed
Education
2. Site context + analysis

2.1 Site Description + Local Context

The site comprises approximately 10.77ha of land, being Lots 18-20, 252, 254 and 255 Lefroy Road, Beaconsfield. The land is owned by the City of Fremantle, MRWA and WAPC. Certificates of Title detailing land ownership are provided at Appendix One.

The site is located approximately 2 kilometres southeast of the Fremantle City Centre (Figure 2). Surrounding development is predominantly residential. The Strang Court Mixed Use area is located to the south-west.

The site is abutted on its eastern boundary by the South Fremantle Senior High School. The interface between the two sites comprises the school’s playing fields.

Vehicle access to the site is taken from Clontarf Road via Mather Road to the south. Steep embankments from Lefroy Road to the north and Salentina Ridge to the west prevent access from these directions. The land is well serviced by public transport with existing services in walking distance on Lefroy and Clontarf Roads respectively.

Until 1978 the site was a limestone quarry. From the 1970's onwards to the present day, the land has been progressively filled with municipal landfill, comprising mostly soil and inert waste.
2.2 Site Analysis

The following summary outlines the site's existing environmental conditions and is taken from the Geotechnical and Environmental Information Report (GEIR) provided at Appendix Two to this report.

Geotechnical investigations were carried out in conjunction with environmental assessment for the presence of landfill gas and for assessment of soil and groundwater quality. The environmental assessment was carried out in general accordance with the Department of Environment and Conservation's (DEC) Contaminated Sites Management Series. The results of the investigation indicated that the waste is predominantly inert waste comprising construction rubble/demolition waste. Two areas of deep fill were encountered and some voids were also detected in a few locations. Asbestos was observed in fragment form on the site's surface and at depth within the fill material. The site will be managed as an asbestos impacted site if no further delineation of the extent of asbestos fragments is to be undertaken.

Based on the residential development scenario proposed in the LSP, geotechnical site preparation and importing of clean fill will be required to minimise exposure to the underlying construction rubble/demolition waste for residential and passive recreational land use (for further detail see Section 8.1 of this report).

Groundwater results generally indicated that the groundwater quality is comparable across the site and with surrounding groundwater quality, with one exception which indicated the presence of impacts consistent with leaching of contaminants from the soil contamination. Further groundwater monitoring both onsite and offsite has been recommended to evaluate this contamination. In addition, further groundwater information for the overall site will be collected to assess baseline groundwater quality prior to site development consistent with the Commission's requirements set out in its Better Urban Water Management Guidelines (October 2008).

The site is a highly modified ecosystem and no native fauna were observed.

To ensure that any potential for unacceptable impacts to the community are mitigated, the GEIR recommends the preparation of a comprehensive Environmental Management Plan. This includes a range of sub-plans summarised as follows:

- Unexpected Findings Plan
- Asbestos Management Plan
- Air Quality Management Plan
- Noise Management Plan
- Urban Water Management Plan
- Fauna Management Plan
- Weed Management Plan

Therefore, subject to the proposed remediation and management measures detailed above (including a memorial on title), the site is considered suitable for residential development and the risk to human health and environment is considered to be low.
Figure 4 - Metropolitan Region Scheme

Figure 5 - Local Planning Scheme No. 4
3. planning context

3.1 Metropolitan Region Scheme

The site is zoned ‘Urban’ in the Metropolitan Region Scheme (MRS) (Figure 4).

Surrounding land is also zoned ‘Urban’. Adjacent land to the northeast is reserved for ‘Public Purposes – High School’ and land north of Lefroy Road ‘Public Purposes – Technical School’.

3.2 Local Planning Scheme No.4

The site is zoned ‘Development’ in the Scheme (Figure 5) and is included in ‘Local Planning Area 5 – Beaconsfield’. There are no specific provisions relevant to the site’s development detailed in the associated policy for Local Planning Area 5.

The site is also included within ‘Development Area 7 – Lefroy Road Quarry’, ‘Development Plan 16 – Land Previously Reserved in the Metropolitan Region Scheme for the Fremantle Eastern By-pass’ and ‘Development Plan 19 – Beaconsfield’. The LSP satisfies the Scheme requirements for Development Area 7 which include:

• Preparation of a structure plan to guide subdivision, land use and development;
• Investigation of potential site contamination; and
• Provisions of Development Plans 16 and 19 to be applied to the site. The provisions of Development Plans 16 and 19 are identical and apply to development applications lodged within the relevant areas. These require:
  - Have regard to potential contamination;
  - Forward substantial applications to the relevant branch of the DEC accompanied by a Detailed Site Investigation.

The technical reports accompanying the LSP propose a regime for remediation that satisfies the requirements of Development Plans 16 and 19 and avoids the need for referral of individual development applications once the LSP is adopted.

Surrounding land is predominantly zoned ‘Residential’ with a range of residential densities. Adjacent land to the northeast is reserved for ‘Public Purposes – High School’ and land north of Lefroy Road ‘Public Purposes – Technical School’ consistent with the MRS designation. The Portuguese Club to the south is reserved for ‘Community Facilities’. Adjacent land is also included within ‘Development Plan 19 – Beaconsfield’. Land to the south and southwest is included in ‘Development Area 14 – Strang Court Area, Beaconsfield’.

3.3 Directions 2031 and Beyond (WAPC, 2011)

Directions 2031 is the State Government’s spatial framework and strategic plan guiding the detailed planning and delivery of housing, infrastructure and services necessary to accommodate growth up until 2031. Directions 2031 is supported by a series of Sub-Regional Strategies providing further detail about how the plan is to be implemented in each sector. The City of Fremantle is located within Quadrant 3 of the Central Sub-Regional Strategy. The Strategy establishes an overall target for the City of Fremantle of accommodating an additional 3,500 dwellings to 2031.

The subject site is identified at Appendix 3 of the Sub-Regional Strategy as ‘Lefroy Rd – DA7’ accommodating a projected dwelling yield of 170 dwellings.

3.4 Liveable Neighbourhoods (WAPC, 2007)

Liveable Neighbourhoods (LN) is the WAPC’s current operational policy guiding the design and approval of structure plans. The objective of LN is the delivery of new developments that provide high quality living, working and recreational environments, thereby contributing to the successful implementation of the State Planning Strategy and State Sustainability Strategy.
The LSP meets the requirements of LN with a particular focus on the following key aims:

- An urban structure based on interconnected, safe and walkable neighbourhoods that is aimed at reducing car dependency;
- Creating a sense of community, identity and a sense of place;
- Providing a variety of lot sizes and housing types to cater for the diverse housing needs of the community at densities that can support local services and public transport; and
- Maximising land efficiency wherever possible.

3.5 Local Planning Strategy
(City of Fremantle, 2001)

The Strategy provides a strategic framework for the City’s development for 10 to 15 years. Its purpose is to:

- Set out the framework of State and regional policies and interpreting these for Fremantle;
- Provide the planning context for the zones, reservations and statutory provisions contained in the City Planning Scheme; and
- Provide the strategic direction of future population and employment; the broad strategies for housing, employment, shopping and business activities; and proposals for transport, parks, regional open space and other public uses.

The Strategy identifies the subject site as a Development Area for residential development and open space with a nominal density of R35/40. The Strategy notes that site remediation and structure planning are required. These requirements are reiterated in the Scheme.

3.6 Green Plan
(City of Fremantle, 2001)

The vision of the City’s Green Plan is given as:

‘Fremantle has a network of high quality parks and reserves, complemented by well vegetated and maintained verges and private open space areas. These spaces offer diversity of experience and linkage across the city.’

A key means of achieving this vision is the identification of future sites that contribute to a network of green spaces and linkages throughout the City. The subject site is identified as both a potential green space and linkage, connecting through to the Clontarf Hill reserve (see Figures 6 and 7). The LSP provides the necessary ‘green’ connectivity with two substantial areas of open space providing almost 40% site open space. The design also incorporates strong green linkages through the use of vegetated, shady streets and excellent pedestrian connections to adjoining residential areas, despite the challenging topography.
Figure 6 - Greening Opportunities

Legend:
- Existing open space
- Greening opportunity sites
- Site Boundary

Site 8

Figure 7 - Preliminary Linkages

Legend:
- Existing open space
- Preliminary linkages - subject to detailed planning
- Important linkages within the City of Port Hacking
- Site Boundary
Figure 8 - Design Concepts
4. design history + community consultation

Preparation of the LSP commenced in 2006, with an investigation of potential design responses to the site’s specific constraints. These included:

- Uncontrolled fill from use of site for landfill;
- Level differences across the site and to adjoining sites;
- Resolution of the batter to Salentina Ridge and the adjoining residential development to the west; and
- Future interface of development with the private residential land on Lots 21, 253, 251, 250, 9, 100 and 101 (see Figure 9), existing development on Lot 102 and the Portugese Club (Lot 5) to the south and the South Fremantle Senior High School.

These investigations have resulted in a number of different development scenarios being prepared and evaluated for practical implementation and commercial viability. An overview of these scenarios in plan form is provided at Figure 8.
During design development there have also been numerous briefings to Councillors and information sessions with the Beaconsfield Precinct Group. The culmination of this preliminary consultation was a Community Workshop held at the Winterfold Primary School on Saturday 23 May 2009, with local community members, representatives of the Beaconsfield Precinct Group, the City of Fremantle, private landowners of adjacent properties and the consultant team. The key design outcome of the workshop was a concept plan provided at figure 11.

Further testing of the plan developed at the workshop resulted in the current LSP design (see Figure 12). The design has remained faithful to the original conception of a strong north-south linkage of open space throughout the site.

The primary amendment to the workshop design arises as a result of the expansion of the non-developable land area, particularly in the northern half of the site. All development is now located outside of the non-developable area and the northernmost open space area is co-located with the open space on the high school site. Two areas for further investigation are identified where it is hoped that technological advancements may make future development feasible.

The community will continue to be involved through briefing sessions and formal public consultation associated with consideration of the Local Structure Plan.
5. community design + lot layout

5.1 Design Objectives

The specific objectives for the LSP are aligned with LN objectives, being to:

- Design a walkable, interconnected street network that is integrated with adjoining development;
- Use built form to capitalise on the existing landform and capture the site’s unique sense of place;
- Provide a mix of lot sizes and dwelling types that address topographical constraints and ensure a variety of housing choices that are appropriate to the locality; and
- Integrate open space, drainage and non-developable areas for the aesthetic and recreational value of future residents and the local community.

5.2 Design Response

As detailed at Section 4, the final design has been influenced by the location of the two key open space areas, where geophysical constraints currently prevent development. This creates two discrete areas for development in the southern and northern parts of the site.

Residential density in the southern portion of the development is set at R40, complementing adjoining residential development to the south. A road connection is provided through the existing cul-de-sac consistent with the Structure Plan for Lots 4 and 102 Mather Road, Beaconsfield (see Figure 15). Density adjacent to the Portugese Club is set at R15 to enable larger lots that are capable of incorporating the significant slope at this location. A pedestrian link (in the form of a staircase or similar) is identified up Salentina Ridge providing connection to development at the top of the embankment. The existing pedestrian linkage through the South Fremantle Senior High School to Lefroy Road is proposed to be retained and formalised (Figure 16).
Residential density in the northern portion of the site is provided at densities of R15, R40 and a split code of R40/100, dependent on topography. The northern portion of the development comprises development on flatter ground, with laneway access provided to some lots and some lots with direct frontage to adjoining open space areas. Development is also proposed in a north-south alignment along Salentina Ridge, where it is anticipated that an alternative built form response will be required to typical ‘slab-on ground’ construction.

The use of the minimum/maximum R40/100 code is intended to facilitate the opportunity for more intensive development on the land should the technical capacity for this become available. Currently, market conditions are not conducive to more intensive development than R40, given the anticipated cost of construction. However, by adopting the split code, the opportunity is retained to increase the scale of development in response to market conditions and to achieve the more ambitious diversity and density targets established in Directions 2031.

To promote housing diversity the LSP includes a provision requiring that in development comprising ten or more Multiple Dwellings, a minimum of 25% of the total number of dwellings must have a maximum floor area of 60 sq m or less and no more than 40% of the total number may have a floor area of 120 sq m or more.

Two areas for further investigation are also identified on the LSP where it is hoped that technological advancements may make future development feasible. If this is not possible it is expected that these areas would be set aside as open space and consolidated, where possible, with adjoining open space reserves.

The development achieves high levels of solar orientation with 82% of lots cardinally aligned east/west and north/south (see Figure 17).
Figure 18 - Movement Network (courtesy Shawmac)
6. movement network

The following summary is taken from the Transport Assessment prepared in support of the LSP and provided at Appendix Three. The transport assessment has been undertaken to assess the potential effect that development of the site will have in terms of the interaction with the existing and proposed road network. The assessment focuses on the following key matters:

- The capacity of the local road network to accommodate the additional traffic generated by the proposal;
- The extent to which the additional traffic generated can be safety managed on the adjacent current and future road network;
- The provision of safe access to the proposed subdivision from the adjacent road network; and
- The safety and efficiency of the site’s internal road network, and in particular the extent that the site is able to safely and efficiently accommodate alternative and sustainable transport modes including pedestrians and cyclists.

The analysis shows that traffic will be distributed to Clontarf Road via Mather Road. With the exception of the main north-south link, all streets within the subdivision are predicted to carry relatively low traffic volumes generally less than 1,000 vehicles per day, with most predicted to carry less than 500 vehicles per day.

The proposed street network will provide an acceptable range of choices for travel and ensure that traffic volumes on individual streets can be kept below threshold levels to ensure the amenity of the area is preserved and safe movement options exist for pedestrians, cyclists and local traffic.

The assessment includes recommendations for the provision of pedestrian and cyclist facilities (see Figure 18). Detailed design will incorporate pedestrian crossing points in line with those shown and may range from a minimum requirement for pram ramps to be provided at each intersection, through to median islands installed at key intersections so as to provide safe refuge. Allowance has been made to provide 1.8m wide footpaths on all roads except laneways.

As shown on Figure 13, the LSP also includes provision for a future road connection from the development to Lefroy Road. The provision of this potential road connection is subject to further engineering feasibility and detailed design as it is located over the top of an area of deeper landfill which would need to be stabilised.

Overall the assessment did not identify any specific issues that present unacceptable risks to the road user or that cannot be managed through appropriate design protocols.
Figure 19 - Public Open Space
7. public open space

The location of open space on the site is influenced by the geophysical constraints to development posed by the deeper landfill areas. This results in two major open space areas being provided, corresponding to the two areas where development cannot, or is not expected, to occur, given current technological limitations and costs associated with remediation (see Figure 19). Both of these open space areas will be impact compacted to achieve approximately 12% reduction in the depth of the uncontrolled fill.

Should the areas identified for further investigation prove incapable of development, it is expected that these areas would be consolidated into adjacent open space.

Even with the further investigation areas being excluded, open space significantly exceeds the minimum 10% required by Liveable Neighbourhoods, with a total open space provision of 4.06ha, equivalent to 37.7% of the total site area (see Figure 20).

Open space areas will be remediated and developed for passive recreational use including:

- Recreational equipment (such as play areas and BBQ facilities);
- Landscaping in accordance with water sensitive design principles and relevant recommendations of the City’s Green Plan;
- Integration with the pedestrian/cyclist network within the site and to external destinations, including a connection up Salentina Ridge to the adjoining development to the west and accommodating the north-south link through the site identified in the City’s Green Plan; and
- Remediation as required in accordance with the requirements of an approved Site Management Plan.

Given the significant oversupply of open space that is proposed, it is recommended that the future development of adjoining private land be required to provide cash-in-lieu of open space, rather than provide additional land for this purpose. Such monies would be used for the continuing installation and upgrade of facilities in the nominated open space areas, ensuring that there is a direct nexus of value and amenity to the future residents of the affected sites.

<table>
<thead>
<tr>
<th>Area</th>
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<tbody>
<tr>
<td>Site Area</td>
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<tr>
<td>Gross Subdivisible Area</td>
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<tr>
<td>POS @ 10%</td>
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<td>0.63ha</td>
</tr>
<tr>
<td>POS Provision</td>
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</tbody>
</table>
8. built form strategy

8.1 Remediation

The site is to be remediated using a combination of impact compaction and removal of uncontrolled fill off site. Where there is minimal uncontrolled fill, the material will be removed off site and replaced with clean fill.

To enable impact compaction, the ground will need to be prepared by levelling and placing a 350mm layer of crushed limestone. The actual compaction depths will be dependent on the type and consistency of the waste. Areas nominated for residential development, services and amenities will be compacted. Effective compaction using this technique will provide a Class P Site in accordance with Australian Standards AS 2870, Residential Slabs and Footings.

In all locations a minimum of 1m clean fill has been allowed for above the compacted controlled fill.

Residential development will be constructed over the compacted areas of shallow fill. The remainder of the site including areas of deeper fill will be used as public open space or passive recreation areas.

The range of management measures summarised at Section 2.2 of this report will be implemented to ensure that there is no off-site impact.

8.2 Built Form

The site’s unique topography creates an opportunity to use built form to make development possible on areas of more severe slope, or those areas where ground conditions militate against traditional construction methods.

Salentina Ridge in particular is an 18 metre high, 38 degree embankment on the western boundary of the site. This is potentially a dramatic location for alternative forms of construction where built form could be used to:

- Respond to the verticality of the edge condition;
- Provide an alternative housing product to what currently exists locally; and
- Capture the easterly inland views and immediate views of the high school playing fields.

In consideration of this, the use of light weight construction on steel pole sub-frames may be appropriate both to Salentina Ridge and the slope adjacent to the Portuguese Club. In these areas the cost impact of this style of construction may be competitive with that of a masonry home, based on savings associated with minimising remediation works of potential contamination issues in the existing uncontrolled fill. If this approach were applied to the flatter areas of the site, this could also reduce the dependence on importation of fill to achieve levels for a standard subdivision layout, significantly reducing development costs and development timeframes due to a prolonged bulk earthworks program and the availability of fill. The Engineering Services Report provided at Appendix Four provides further guidance on recommended treatments for bulk earthworks for each of the residential development scenarios.

Building heights within the development are generally as per the relevant requirements of the Residential Design Codes (Codes), as follows:

- Single or grouped dwellings at any density – as per Category B of Table 3 of the Codes;
- Multiple dwellings – at density up to and including R60, as per the maximum height for R60 development specified in Table 4 of the Codes; and
- Multiple dwellings – at density over R60 up to and including R100, as per maximum height for R100 development specified in Table 4 of the Codes.
8.3 Detailed Area Plans

To ensure that key principles of solar orientation, surveillance and streetscape are addressed in a uniform and co-ordinated manner, Detailed Area Plans (DAP’s) are proposed throughout the LSP area. The use of DAP’s will also facilitate opportunities for alternative building typologies that might otherwise be precluded by the generic provisions of the Residential Design Codes.
9. engineering considerations

The following summary is taken from the Engineering Services report prepared in support of the LSP and provided at Appendix Four.

9.1 Stormwater Drainage

It is anticipated that a local water management strategy or an urban water management plan will be prepared for managing water at the site. All road reserves will be drained with a conventional piped stormwater drainage system. The site will be designed so that the lowest points are located where the drainage swales are proposed as shown on the LSP. It is envisaged that a 1 in 100 year storm event can be accommodated within these proposed drainage swale systems.

An alternative to a conventional piped stormwater drainage system would be under road rain store tanks or similar. These have been used successfully on other projects in the past and can be used in combination with conventional piped stormwater drainage system.

In addition to overground stormwater drainage management, subsurface stormwater drainage will require to be designed for subject to further environmental investigations. For the purpose of this report it is assumed that subsurface drainage can be allowed for in the current plan however the extent and cost would need to be determined at detailed design stage.

9.2 Sewer And Water Reticulation

All lots will be served with a reticulation sewage system which would gravitate into the existing gravity sewer within Annie Street and Duffield Avenue.

The traditional and hillside lots will be connected to the existing DN100 water reticulation mains on Butterworth Place and Duffield Avenue. The remainder of lots will be connected to the existing DN100 water reticulation main currently terminating at the intersection of Mather Road and Annie Street. A DN100 water reticulation main loop shall be created around the middle row of rear loaded lots.

9.3 Power

Underground power is proposed to service all lots within this development. Additional transformers may be required across the site to cater for development at higher densities.
10. Conclusion

The LSP provides a flexible design response to a site with numerous topographical and historical challenges. The LSP facilitates a strategy for the effective remediation of the site and a design that will deliver substantial public benefits to the community, including extensive open space areas, green linkages and high quality development.