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8th May 2020

Our Ref: A18652-L2/af

Western Sydney Parklands Trust
P.O. BOX 3064
PARRAMATTA NSW 2124

Attn: Mr Luke Wilson

Dear Luke,

RE: LIGHT HORSE INTERCHANGE BUSINESS HUB (SSD 9667)
RESPONSES TO SUBMISSION – DEPARTMENT OF PLANNING, INFDUSTRY AND ENVIRONMENT.

The following letter is written to provide a detailed response to submissions by the Department of Planning, Industry and Environment for the Lighthorse Interchange Business Hub, Eastern Creek (State Significant Development (SSD) 9667). The response relates to submission points 1 and 4 provided by the Department of Planning, Industry and Environment during the exhibition date between 12 August and 11 September 2019. The responses should be read conjunction with previous responses to the DPIE. The specific submission raised is shown below with further additional responses provided by the applicant.

1. Subdivision Layout and Access

The EIS and BDAR note that alternative access points to the site were considered to avoid and minimise impacts on native vegetation. Further information is requested regarding these alternatives including a more detailed evidence-based justification for why these alternatives are not feasible.

It is understood the DPIE is requesting further information to the subdivision's layout, specifically the water management basin, which is to be reviewed with earlier responses regarding the provision of access to the development. Considerable early investigations were undertaken by Henry & Hymas Engineers and Costin Roe to establish a primary access location, developable area and Lot layout that incorporates principles of sustainable engineering and responds to the surrounding natural and urban environment.

The location of water management basin is predominately driven by constraints relating to flooding and stormwater, these constraints are discussed in detail in submission point 4. Flooding, Stormwater and Earthworks. Other constraints relating to the location of the basin are discussed in detail below.

As previously raised, flexibility in the primary access location is inherent constrained by the geometric constrains of surrounding road infrastructure (notably the M7 Westlink and Wallgrove Road), existing services (major high-pressure gas easement and sewer line) and the surrounding natural environment. The position of the given central access road unfortunately provides little flexibility in the general subdivision of lots for development. From a civil engineering perspective, the general development area arose, and individual lots were partitioned from the developable areas, based on a number of factors including, and not limited to:

- Constraints relating to existing high-pressure gas easement i.e. providing combined water management basin adjacent to gas easement rather than developable lots which can potentially pose additional risk to the existing high-pressure gas line.
- Alignment to existing sewer easement (provide suitable lot shapes which allow for future construction of structures outside of the zone of influence of the existing sewer).
- Minimisation of disturbance to the natural environment i.e. broadly speaking developable area is arranged to minimise ingress into major vegetation clusters. Refer to Ecology Report by Ecoplanning for further details.
- Minimise impacts on flooding within the Eastern Creek Floodplain. This is achieved by minimising filling in Eastern Creek Floodplain, especially key flood throttling locations, and minimisation of pad levels and subdivision infrastructure levels (site grading is discussed in further detail in response to point 4. Flooding, Stormwater and Earthworks).
- Provide emergency access circulation and align to existing and proposed access points (M7 underpass, and given primary access location).
- Circulation of large vehicles servicing the development.
- Provide continuation of existing overland flow paths and internally manage and reduce number of overland flows within the development.
- Provide Lot layouts and road network that drain to a single communal stormwater management basin. Stormwater quantity and quality is proposed to be managed in a single communal basin for a number of reasons:
    - Minimise number of outlets, and thus ecological impact to surrounding natural water-courses.
    - Minimise number of crossings of existing sewer easements.
    - Prevent crossing of the existing high-pressure gas main.
    - Reach improved economies of scale, with a single large bioretention basin and detention basin.
    - Facilitate single point of maintenance and minimise maintenance paths and infrastructure.
    - Minimise number of basin overland flow paths traversing the proposed development.
    - As previously noted, implications relating to hydraulics and flooding onsite, refer to response to submission point 4 below.

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4. Flooding, Stormwater and Earthworks

The EIS identifies that approximately 905,000m3 of fill is to be imported (pg. 49). The civil engineering plans show filling of up to 6 m across parts of the site. Further explanation and justification is required for the extent of filling proposed given the difference between the building pad levels and the 1 % AEP flood levels.

Reponses is to be considered and reviewed in conjunction to engineering comments relating to access and site layout, refer previous responses and above.

Similarly, to the subdivision layout, considerable site grading investigations and iteration of Lot levels was undertaken to form a site topography which minimises filling, especially within the Eastern Creek Flood Plain.

Following the reception of comments from the DPIE further investigations were undertaken to reduce the import of suitable material to site. Site grading and drainage were amended to reduce the Pad levels for Lot 5 and Lot 7. Additionally, investigations into the reuse of site material were explored, preliminary geotechnical data suggest topsoil stripped from the development can be blended and suitable re-used as fill material. The inclusion of stripped material both reduces export from site and import of material. Furthermore, allowances were made for the extensive trenching to facilitate the installation of drainage infrastructure as well as sewer and electrical services.

Taking into account the reduced pad levels, allowances for material re-use, and services trenching the designer notes a decrease in potential import to 833,484m^3, a substantial decrease from a previously noted import of 911,737m^3. Whilst this is a large amount of shortfall, the amount of fill is required to accommodate the development and at the same time, the development does not place a strain on landfill resources as there will be no soil waste generated from the site and the importing of material from external sources further reduces the impacts on local landfill resources as material that would have otherwise been disposed of can be imported to site.

The designer notes to further amend the site grading and drainage to reduce import of will likely have negative impact on the civil design. Following the amendments the subdivision infrastructure site grading and determination of Lot levels were finalised to satisfy the following objectives.

- Respond to natural topography (falling from west to east) and closely match existing interfaces along limit of work boundaries.
- Minimise earthworks on-site, particularly within the eastern Creek Flood plain and neighbouring clusters of vegetations.
- Minimisation of retaining structures and battering.
- Provided suitable and serviceable accessible access grades for heavy vehicles accessing the development. Note: there is limited flexibility in the difference in level between the individual lots. The location of a given Lot entrances relative (fixed as per site layout, refer response to comment 1) to one-another combined with the maximum road and crossover grades prevent a large difference in level between the individual lots. The significance of this is that lots generally cannot be drastically lowered in relation to one another otherwise the resulting grades would not support articulated vehicle access.

- Provide immunity to mainstream flooding, local overland flow paths and effectively drain stormwater from the subdivision & future developments.

The designer notes there is considerable difference between the some of the building pads levels and the 1 % AEP flood levels. Although several of the above factors affect the level at which a pad level is determined, significant to the proposed subdivison, is the pad levels are predominately set to allow the sites to drain effectively. How the flood level relates to the proposed pad levels is a process dictated by the hydraulics of the proposed stormwater system and how the downstream water level (set by major flooding) traces back up the stormwater system to affect the individual future Lots. For the purpose of providing a brief response the process can be simplified into three stages, listed below:

- Interaction of Flooding and On-site stormwater detention i.e. How flooding dictates base level and location of on-site detention basin and sets the initial downstream water level.
- Dimensions of stormwater detention basin i.e. how the geometric constrains of the detention basin set the downstream water level for in-ground pipe network.
- Subdivision in ground pipe network i.e. How the water level in the basin translates to minimum pad levels

Interaction of Flooding and On-site stormwater detention (Basin location)

To the agreement of the designer, during pre-submission meetings with Blacktown City Council's Drainage Engineers it was generally determined the on-site stormwater detention basin within the communal water management basin should be founded above the 1% AEP flood. The practice of raising outlet controls and detention storage above major flooding is generally supported as the detained run-off can be effectivity stored without a backwater effect on the outlet control or diminishment of the basin available capacity by flood waters.

As previously established in in response to comment 1, it is ideal to provide a single communal water management basin in the currently proposed location. From review of Figures 2-5 & 3-2 of Flood Impact Assessment, it is noted flood levels in both the existing and post developed scenario generally fall in towards the North East. In terms of interaction with flooding, the on-site stormwater detention basin is optimally located within the site at a location with the lowest available flood levels whilst still providing an outlet that discharges to an existing watercourse and does not cross the existing high-pressure gas line.

Dimensions of stormwater detention basin

The dimensions of stormwater management basin have been optimised, as allowed by general site constraints, to maximise storage area and minimise storage depth. The area of storage within the basin encompassed during a 1% AEP storm event is over 12,500m^2 measuring approx. 200m in length and 90m in width. The maximum basin depth is 2.1m. The proposed design allows for a maximum amount of stormwater storage for a minimum increase in potential basin water levels.

It is generally best engineering practice to design in-ground stormwater piped networks under the assumption the on-site detention system is at capacity, either due to previous storm events or outlet

blockages etc. For that reason, the basins expansive area reduces the top water level of the basin for the next stage of the process, refer below.

Subdivision in ground pipe network

The in-ground stormwater piped network collects runoff from the subdivision infrastructure (road reserve etc.), and run off from future individual lots, and routes the stormwater to the onsite stormwater detention basin. As a result of the proposed site layout and on-site detention basin's location (discussed in response to submission point 1) the in-ground pipe layout, although efficient in nature, can extend up to 800m in length for some and above pipe runs. The top water level of the basin is intrinsically linked to water level throughout the in-ground stormwater system and in short is a function of hydraulic loss of the system. Additionally, it is generally best engineering practice to ensure freeboard is provided from a proposed floor level to the water level in the neighbouring in-ground pipe network. For this purpose, the in-ground stormwater system was designed to minimise the water level tracing from the detention basin, which can potentially impact the subdivision infrastructure of future developments. In summary this is achieved by:

- Increasing the capacity of the in-ground system: Compared to the specific catchment, the in-ground system is generally oversized to minimise hydraulic losses (Friction losses) and allow for lower floor levels. This Is evident in the 2 x 2.4 x 1.2 concrete box culverts in the central drainage corridor of the in-ground system between the access road and the water management basin.
- Specialised design of key hydraulic systems: Major hydraulic structures, such as the diversion weir for the southern bioretention have been specially designed to minimise hydraulic losses. The gross pollutant trap servicing the southern bioretention has been custom designed to reduce hydraulic losses by diverting flows via a low flow drop diversion structure. The corresponding 'gain' over a common proprietary system (with shorter weir and increased hydraulic loss) provides a more hydraulically efficient system which allows for corresponding lower floor levels. The structure has been extensively coordinated with BCC drainage engineers.

Conclusion

Given geometric site constrains relating to access and layout and the nature of filling within a floodplain the development requires a considerable import of fill. The importing of fill is driven by the disparity between design surface levels and existing site levels. Design surface levels and layout are largely dictated by the stormwater system and major flooding. Where possible, adjustments to site layout and intentional oversizing of stormwater pipe networks and hydraulic features were made to lower design surface levels and thus, lower import to the development. It is the opinion of the designer that filling onsite and subdivision layout is in optimal balance with other engineering factors, and that significant reduction of site levels or layout would negatively impact the stormwater drainage system.

We trust this satisfies any concerns you have in the regards to the subdivision layout, earthworks, stormwater and flooding. Feel free to contact myself or Project Engineering Nicholas Wetzlar on 9417 8400 for further information.

Yours faithfully,

ANDREW FRANCIS

For, and on behalf of,

H & H Consulting Engineers Pty Ltd