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PROJECT: PHASE 1 FLOOD RISK ASSESSMENT

LOCATION: 20 PARK ROAD

PREPARED FOR: MR AND MRS RHODES

RESIDENTIAL DEMOLITION AND REBUILD

20 PARK ROAD
CHANDLERS FORD
SOUTHAMPTON
HAMPSHIRE
SO53 2EU

PROJECT #: 2129

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SUMMARY

This report presents the findings of a Flood Risk Assessment (FRA) that has been carried out for the proposed development at 20 Park Road, Chandlers Ford, Southampton, Hampshire, SO53 2EU. This FRA has been carried out using current best practices, and against the criteria set out in The National Planning Policy Framework (NPPF).

The proposed development is for the demolition of the existing bungalow and construction of a replacement chalet style two storey dwelling. All sleeping accommodation is located to the first floor. Existing sleeping accommodation is currently located to the ground floor, therefore the proposed development will be providing significant betterment.

The development site lies adjacent to the Monks Brook, which is culverted in this locality. According to low detail, national-scale flood mapping created on behalf of the Environment Agency (EA), the site would appear to lie within Flood Zone 3a (high probability of flooding). Detailed modelling has not been carried out for the main river channel in the vicinity of the site; however, the EA have confirmed that basic JFLOW modelling is available.

Comparison of JFLOW derived flood levels with site topographic levels identifies the site and proposed development is located within the 1:100 year floodplain. As such the site is located within Flood Zone 3a. The site falls within 8m of the Monks Brook which is classified as an EA 'Main River' and as such the developer may need to apply for Flood Defence Consent from the EA.

Following development, there will be an increase in building footprint, however the developer has agreed to incorporate undercroft void areas to the 1:100 year flood level plus 600mm. As such, there will be no loss of flood storage post development and the proposed development will be situated well above the modelled 1:100 year flood level, and will not contribute any additional built footprint within the floodplain.

The risk from fluvial flooding to the existing property is considered to be of **high significance** due to the proximity of the site to the source of flooding. The risk of fluvial flooding to the proposed development will be **reduced significantly** post development.

As such, given that:

a) the site lies within an existing developed area, and is for the demolition and replacement of an existing dwelling on a larger footprint;

b) the developer has agreed to incorporate undercroft void areas to the 1:100 year level plus 600mm, such that there will be no loss of flood storage post development providing a betterment over the existing situation;

c) finished ground floor levels and threshold levels will be set at least 600mm above the 1:100 year flood level; and,

d) a safe access and egress route will be provided by a formal flood warning and evacuation plan, which will be agreed with emergency planners, and tied in to the existing emergency plans for the area.

following the guidelines contained within NPPF, the proposed re-development is considered to be **suitable**, assuming appropriate mitigation (including adequate warning and evacuation procedures) can be maintained for the lifetime of the development.

DEVELOPMENT DESCRIPTION	EXISTING	PROPOSED
Development Type	Bungalow	Chalet style 2 storey dwelling
Number of bedrooms	N/A[2]	N/A[2]
EA Vulnerability Classification	More vulnerable	No change
Ground Floor Level	23.69mAOD	24.92mAOD
Level of Sleeping Accommodation	Ground Floor	First floor
Impermeable Surface Area	N/A[2]	N/A[2]
Surface Water Drainage	N/A[2]	N/A[2]
Development Size	N/A[2]	N/A[2]

RISK TO DEVELOPMENT	SUMMARY	COMMENT
EA Flood Zone	3a	Comparison of modelled flood levels with site levels shows entire site is within Flood Zone 3a
Flood Source	Fluvial	Monks Brook (culverted)
Modelled 1:100 year fluvial flood level	24.13mAOD	JFLOW derived flood levels
with climate change (+ 20%)	N/A[2]	
Modelled 1:1000 year fluvial flood level	23.82mAOD	
with climate change (+ 20%)	N/A[2]	
Recorded Flood Events in Area	NO	
Recorded Flood Events at Site	NO	
SFRA available	YES	Partnership for Urban South Hampshire (PUSH; December 2007)

FLOOD RISK MANAGEMENT MEASURES	SUMMARY	COMMENT
Ground floor level above 1:100 year CC flood level?	N/A[2]	Ground floor level set at least 600mm above JFLOW 1:100yr flood level
Safe Access/Egress Route?	N/A[2]	Evacuation strategy
Flood Resilient Design?	YES	Raising of ground floor level and undercroft voids used
Site Drainage Plan?	N/A[1]	
Flood Warning & Evacuation Plan?	YES	EA's Flood Warning Service.

OFFSITE IMPACTS	SUMMARY	COMMENT
Displacement of floodwater	None	Undercroft voids used
Impact on local geomorphology	None	
Increase in surface run-off generation	Negligible	Permeable paving and rainwater recycling recommended
Impact on hydraulic performance of channels	None	Does not affect channel

Table S1: Summary of flood risks, impacts and proposed flood mitigation measures.

N/A[1] *not required for this assessment*

N/A[2] *data not available*

DEVELOPMENT DESCRIPTION AND LOCATION

PROPOSED DEVELOPMENT AND LOCATION

The proposed development site is located at 20 Park Road, Chandlers Ford, Southampton, Hampshire, SO53 2EU (*Figure 1 and 3*).

The proposed development is for the demolition of the existing bungalow and construction of a chalet style two storey replacement dwelling. All sleeping accommodation will be located on the first floor. The existing sleeping accommodation is currently located to the ground floor, therefore the proposed development will be providing significant betterment.

Indicative ground levels vary between approximately 23.42mAOD and 24.56mAOD across the site. The existing floor level is 23.69mAOD (*Source: Ian Wood Design Consultant; Figure 3*). The developer has agreed to raise the ground floor for the proposed development to 24.92mAOD.

VULNERABILITY CLASSIFICATION

Both the existing and proposed development are residential, and are classified as 'More Vulnerable' under the NPPF.

SEQUENTIAL TEST/ EXCEPTION TEST

Under the NPPF, all new planning applications must undergo a *Sequential Test*. This test must be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain. The test refers to the EA Flood Zones described in Table 2. For reference, the NPPF *Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility'* is reproduced below.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓
	Zone 3b (functional floodplain)	Exception Test Required	✓	×	×	×

Table 1: The Sequential Test: *Flood Risk Vulnerability and Flood Zone 'Compatibility'* as specified by National Planning Policy Framework (NPPF). Shaded cells denote the proposed re-development. Please note: ✓ means development is appropriate; × means the development should not be permitted.
(Source: NPPF)

Using the principles of the Sequential Test outlined above, the proposed development is 'More Vulnerable' and is located within Flood Zone 3a. As such, under the NPPF, this development type would normally require the implementation of the Exception Test.

For the Exception Test to be passed, the proposed development must meet the following criteria:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh the flood risk, as informed by a Strategic Flood Risk Assessment;

- a Flood Risk Assessment demonstrates that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

(Source: NPPF)

As such, and in order to address these requirements, the planning application submitted by the client is required to be accompanied by a FRA which shows that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area.

DEFINITION OF FLOOD HAZARD

SOURCES OF FLOODING TO THE SITE

Communication with the EA has identified the following potential sources of flooding to the site:

Fluvial:	Monks Brook
Tidal:	N/A
Surface:	On site
Groundwater:	On site
Sewer:	Adjacent Road
Artificial sources:	N/A

MECHANISMS AND HISTORY OF FLOODING

FLUVIAL

According to low detail, national-scale flood mapping created on behalf of the Environment Agency (EA), the site is located in EA Flood Zone 3 ("high probability of flooding"; *Figure 2*). The site is located within 8m of the Monks Brook which is culverted in this locality. The developer may need to seek Flood Defence Consent from the EA.

Communication with the EA has confirmed that there is no detailed modelling for the Monks Brook in the vicinity of the site; however, the EA has provided basic JFLOW modelling for the site which has revealed a 1:100 year flood level of 24.13mAOD in the vicinity of the site.

Topographic levels across the development site vary between approximately 23.42mAOD and 24.56mAOD.

Comparison of modelled JFLOW flood levels with site topographic levels derived from a topographic survey shows that the site is located within both the JFLOW 1:100 year floodplain and the 1:1000 year floodplain.

The developer has agreed to raise the ground floor levels at least 600mm above the modelled JFLOW 1:100 year flood level, provide voids to allow flood water to flow freely across the site, and locate all sleeping accommodation to the first floor.

SURFACE

The EA's Risk of Flooding from Surface Water map identifies the site to be at 'Very Low' risk of flooding.

No records have been provided suggesting that the site has been previously affected by surface water flooding. As such, the risk from this source to the site is considered to be relatively low.

GROUNDWATER

The EA has identified that the site is located in a Groundwater Minor Aquifer High Vulnerability Zone. The site is not located within a Groundwater Protection Zone.

No recorded have been provided suggesting the site has flooded in the past from groundwater flooding.

However, given that no basements are proposed, solid concrete floors are recommended for the ground floor of the development, and the proposed residential accommodation will be raised at least 600mm above the 1:100 flood level; the risk of groundwater flooding to the site is considered to be relatively low.

SEWER

No records have been provided to suggest that the site has flooded in the past from this mechanism. As such, the risk from this source to the site is considered to be relatively low.

SURFACE WATER DRAINAGE STRATEGY

The proposal is for the demolition of the existing bungalow on site, and the construction of a larger chalet style two storey replacement dwelling.

The developer has committed that runoff from the development will be limited to the existing site runoff rates for all events up to the 1 in 100

year storm (plus an allowance for climate change). As such, the development will have negligible impact in terms of surface water runoff generation.

It is recommended that permeable paving is utilised across the proposed site to help limit the impermeable surface coverage post development. Consideration should also be given to the recycling of rainwater runoff from the roof.

PROBABILITY OF FLOODING

FLOOD ZONE

Initial communication with the EA suggested that the proposed development site lies partially within the 1:100 year fluvial floodplain of the Monks Brook (i.e. EA Flood Zone 3a).

This information is supported by the EA flood risk map (*Figure 2*) which has been produced in part using JFLOW – a relatively coarse, national scale flood modelling strategy. These maps indicate the potential spatial extent of a fluvial/tidal flood event which has a magnitude that is, on average, likely to occur once in every one/two hundred years (i.e. the 1:100/1:200 year fluvial/tidal floodplain respectively).

It is important to note that only the *potential* floodplain is shown; ***the mitigating effects of any flood defences currently in place are not considered***. For reference, the definition of NPPF flood risk zones is included below in Table 2.

	Description
Zone 1	**Low Probability**. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Zone 2	**Medium Probability**. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Zone 3a	**High Probability**. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Zone 3b	**The Functional Floodplain**. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 2: Definition of NPPF Flood Zones. *(Source: EA)*

PROBABILITY OF THE SITE FLOODING

According to the EA Flood Map for Planning (*Figure* 2) the site is located partly within Flood Zone 3a, with at least a 1% annual probability of fluvial flooding.

EXISTING RATES AND VOLUMES OF RUN-OFF GENERATED BY THE SITE

The proposal is for the demolition of the existing bungalow on site, and the construction of a larger chalet style two storey replacement dwelling.

The developer has committed that runoff from the development will be limited to the existing site runoff rates for all events up to the 1 in 100 year storm (plus an allowance for climate change). As such, the development will have negligible impact in terms of surface water runoff generation.

It is recommended that permeable paving is utilised across the proposed site to help limit the impermeable surface coverage post development. Consideration should also be given to the recycling of rainwater runoff from the roof.

CLIMATE CHANGE

HOW WILL THE SITE BE AFFECTED BY CLIMATE CHANGE?

According to the NPPF, climate change is likely to increase the flow in rivers by 20%. As such, the site may be more likely to be affected by flooding.

Furthermore, increases in rainfall would lead to an increased risk of surface water flooding.

DETAILED DEVELOPMENT PROPOSALS

DEVELOPMENT LAYOUT

The proposed development is for the demolition of the existing bungalow and the construction of a larger chalet style two storey replacement dwelling.

See Appendix A for detailed development plans. Figure 5 is a revised plan of the exterior of the proposed development, including proposed void openings locations.

FLOOD RISK MANAGEMENT MEASURES

PROTECTION MEASURES

Given that the site resides in an area at risk of flooding, the proposed development may require flood mitigation measures. The developer has agreed to set all residential floor levels at least 600mm above the 1:100 year flood level. Floor levels will therefore be set no lower than 24.73mAOD. It is understood that the floor levels will be set at 24.92mAOD for the proposed development.

Additionally, the developer has agreed to implement the following measures:

- Bringing down electrical services from ceilings;
- Wiring, power outlets, switches, etc. installed above the maximum potential floodwater level (where possible);
- Air brick protection;
- Situating all sleeping accommodation on the first floor;
- Solid concrete flooring;
- Maintaining internal access from the ground floor to the first floor of the property so that a safe egress route will be provided internally from the ground floor to the first floor and above of the property.

It should be noted the sleeping accommodation is situation on the ground floor of the existing bungalow. Post development, all sleeping accommodation will be situated on the first floor of the dormer bungalow. As such, **a significant betterment is provided**.

The developer is also incorporating voids to allow the flood waters to freely flow across the site in an event of a flood.

Post development, a **formal flood warning and evacuation plan will be implemented**. The site owner will be responsible for receiving and acting on any given warning. Upon receipt of an extreme flood warning, the site will be evacuated, and will not be reoccupied until the warning has been lifted.

It has been agreed that as an additional precautionary measure an evacuation route shall be communicated to all site users so as to enable evacuation from the site in the event of a flood.

ACCESS/EGRESS

In order for an access/egress route to be acceptable under the NPPF, the combination of flood depths, velocities and debris must be analysed. The methodology for calculating "Flood Hazard" is reproduced below according to the methodology stated within the "Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purposes – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1": and is reproduced overleaf:

This table is recommended for development planning and control use.

Table 4 – Hazard to People Classification using Hazard Rating *(HR= d x (v + 0.5) + DF)* for (Source Table 13.1 of FD2320/TR2 - Extended version)

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03+0.5= 0.53	0.05+0.5 = 0.55	0.10+0.5 = 0.60	0.13+0.5 = 0.63	0.15+1.0 = 1.15	0.20+1.0 = 1.20	0.25+1.0 = 1.25	0.30+1.0 = 1.30	0.40+1.0 = 1.40	0.50+1.0 = 1.50	0.75+1.0 = 1.75	1.00+1.0 = 2.00	1.25+1.0 = 2.25
0.1	0.03+0.5= 0.53	0.06+0.5 = 0.56	0.12+0.5 = 0.62	0.15+0.5 = 0.65	0.18+1.0 = 1.18	0.24+1.0 = 1.24	0.30+1.0 = 1.30	0.36+1.0 = 1.36	0.48+1.0 = 1.48	0.60+1.0 = 1.60	0.90+1.0 = 1.90	1.20+1.0 = 2.20	1.50+1.0 = 2.50
0.3	0.04+0.5= 0.54	0.08+0.5 = 0.58	0.15+0.5 = 0.65	0.19+0.5 = 0.69	0.23+1.0 = 1.23	0.30+1.0 = 1.30	0.38+1.0 = 1.38	0.45+1.0 = 1.45	0.60+1.0 = 1.60	0.75+1.0 = 1.75	1.13+1.0 = 2.13	1.50+1.0 = 2.50	1.88+1.0 = 2.88
0.5	0.05+0.5= 0.55	0.10+0.5 = 0.60	0.20+0.5 = 0.70	0.25+0.5 = 0.75	0.30+1.0 = 1.30	0.40+1.0 = 1.40	0.50+1.0 = 1.50	0.60+1.0 = 1.60	0.80+1.0 = 1.80	1.00+1.0 = 2.00	1.50+1.0 = 2.50	2.00+1.0 = 3.00	2.50+1.0 = 3.50
1.0	0.08+0.5= 0.58	0.15+0.5 = 0.65	0.30+0.5 = 0.80	0.38+0.5 = 0.88	0.45+1.0 = 1.45	0.60+1.0 = 1.60	0.75+1.0 = 1.75	0.90+1.0 = 1.90	1.20+1.0 = 2.20	1.50+1.0 = 2.50	2.25+1.0 = 3.25	3.00+1.0 = 4.00	3.75+1.0 = 4.75
1.5	0.10+0.5= 0.60	0.20+0.5 = 0.70	0.40+0.5 = 0.90	0.50+0.5 = 1.00	0.60+1.0 = 1.60	0.80+1.0 = 1.80	1.00+1.0 = 2.00	1.20+1.0 = 2.20	1.60+1.0 = 2.60	2.00+1.0 = 3.00	3.00+1.0 = 4.00	4.00+1.0 = 5.00	5.00+1.0 = 6.00
2.0	0.13+0.5= 0.63	0.25+0.5 = 0.75	0.50+0.5 = 1.00	0.63+0.5 = 1.13	0.75+1.0 = 1.75	1.00+1.0 = 2.00	1.25+1.0 = 2.25	1.50+1.0 = 2.50	2.00+1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15+0.5= 0.65	0.30+0.5 = 0.80	0.60+0.5 = 1.10	0.75+0.5 = 1.25	0.90+1.0 = 1.90	1.20+1.0 = 2.20	1.50+1.0 = 2.50	1.80+1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18+0.5= 0.68	0.35+0.5 = 0.85	0.70+0.5 = 1.20	0.88+0.5 = 1.38	1.05+1.0 = 2.05	1.40+1.0 = 2.40	1.75+1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20+0.5= 0.70	0.40+0.5 = 0.90	0.80+0.5 = 1.30	1.00+0.5 = 1.50	1.20+1.0 = 2.20	1.60+1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23+0.5= 0.73	0.45+0.5 = 0.95	0.90+0.5 = 1.40	1.13+0.5 = 1.63	1.35+1.0 = 2.35	1.80+1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25+0.5= 0.75	0.50+0.5 = 1.00	1.00+0.5 = 1.50	1.25+0.5 = 1.75	1.50+1.0 = 2.50	2.00+1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28+0.5= 0.78	0.60+0.5 = 1.10	1.10+0.5 = 1.60	1.38+0.5 = 1.88	1.65+1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

Flood Hazard Rating (HR) and thresholds

The revised 'hazard rating' expression based primarily, on consideration to the direct risks of people exposed to floodwaters.

HR = d x (v + n) + DF

where, HR = (flood) hazard rating;
d = depth of flooding (m);
v = velocity of floodwaters (m/sec); and
DF = debris factor (0, 0.5, 1 depending on probability that debris will lead to a hazard)
n = a constant of 0.5

This final revised Flood Hazard Rating formula from the Flood Risks to People project is presented on page 10 (section 3.5) of FD2321/TR1. The formula is identical in both FD2320 and FD2321 reports.

Extracts from the Supplementary Note to FD2320/TR2 and FD2321/TR1 describing the methodology for calculating 'Flood Hazard' under PPS25 (Source: EA)

Further to the Flood Hazard Mapping tables from FD2320, it is clear that for an access/egress route to be considered 'safe' under the NPPF; the route must fall within the 'Low Degree of Flood Hazard' classification.

No estimates of the 'velocity' or depth of flood waters for potential escape routes have been provided. The proposed escape route is to leave the property and head west, along the adjacent footpath until Hursley Road is reached. Hursley Road is entirely outside of Flood Zone 3.

As such a dry or 'safe' escape route under the NPPF can be provided. Evacuees would be clear of floodwater almost immediately after leaving the property during a 1:100 fluvial year flood event.

Additionally, internal access is provided to the upper floors, above all potential modelled flood levels, and as such acts as an area of safe refuge above modelled flood levels. Occupants should only follow the escape route in the event of a flood warning. If extreme flooding is already evident then occupants should remain within the property unless advised to do so by emergency services.

EVACUATION STRATEGY

Given that the site lies partially within Flood Zone 3, and as such, it is recommended that the site owner subscribe to the EA's Flood Warning Service. The site owner should ensure that this service is made available to all occupants of the proposed development.

The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.

- On receipt of a **FLOOD ALERT**, the property owner and occupiers should:
    - Monitor the situation via local media;
    - Make themselves aware of forecast local weather conditions;
    - Alert both current visitors, and those scheduled to arrive, of the situation;
    - Prepare to evacuate if necessary.
- On receipt of a **FLOOD WARNING**, the property owner and occupiers should:
    - Follow advice to "go in, stay in, and tune in";
    - Move all vehicles to an area outside of the potential flood extent, if safe to do so;
    - Alert scheduled visitors that they should seek alternative accommodation;

  - Be prepared to follow instruction from the Emergency Services.
- On receipt of a **SEVERE FLOOD WARNING**, the property owner and occupiers should:
  - Follow advice to "go in, stay in, and tune in";
  - Remain attentive to local media forecasts and news bulletins;
  - Do not evacuate unless instructed to do so by the Emergency Services;
  - Only when instructed to evacuate by the Emergency Services, leave the property and follow the agreed evacuation plan.

Additionally, it is recommended that the site be evacuated upon receipt of a severe flood warning. This will help to ensure that the site is unoccupied during a potential flood event.

OFF SITE IMPACTS

IMPACT TO FLOOD RISK ELSEWHERE

Comparison of JFLOW modelled flood levels with topographic levels across the site shows that the site is located within Flood Zone 3a.

An increase in built footprint could potentially reduce the flood storage capacity on site at the 1:100 year level and above.

As such, the developer has agreed to incorporate undercroft void areas to at least 24.73mAOD (1:100 year level plus 300mm to account for climate change, plus 300mm freeboard) for the footprint of the proposed development.

The voids openings will be at least 1 metre wide by the height of the predicted depth of flooding (including climate change and freeboard allowance), extending from the existing ground level. There will be one opening in every 5-metre length of wall on all sides.

The void openings will be designed to be inaccessible, by installing vertical steel bars placed at 100mm centres. This will prevent people from being located within the undercroft area during times of flood, and will prevent the voids being used for storage.

As such, the proposed development will be situated significantly above modelled 1:100 year flood levels, and there will be no additional displacement of floodwater or loss in flood storage capacity of the site post development.

GENERATION OF RUN-OFF

The proposal is for the demolition of the existing bungalow on site, and the construction of a larger chalet style two storey residential unit.

The developer has committed that runoff from the development will be limited to the existing site runoff rates for all events up to the 1 in 100 year storm (plus an allowance for climate change). As such, the development will have negligible impact in terms of surface water runoff generation.

It is recommended that permeable paving is utilised across the proposed development site to help limit the impermeable surface coverage post development.

RESIDUAL RISKS

IDENTIFICATION OF RESIDUAL RISKS

Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:

- the failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
- failure of a reservoir, or;
- a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

Areas behind flood defences are at particular risk from rapid onset of fast-flowing and deep water flooding, with little or no warning if defences are overtopped or breached.

The site does not benefit from flood defences and is not within an area potentially affect by reservoir failure, as such the only residual risk to the proposed development is a failure of the drainage system following an intense rainfall event.

The developer has committed to limiting the runoff rates from the site to the existing runoff rates on site for all events up to the 1 in 100 year storm event (with an allowance for climate change).

CONCLUSIONS

The proposed development site is located at 20 Park Road, Chandlers Ford, Southampton, Hampshire, SO53 2EU. The proposed development is for the demolition of the existing bungalow and construction of a

replacement 2 storey chalet style residential unit. All sleeping accommodation for the proposed development will be located on the first floor, therefore providing a significant betterment to the existing site.

The assessment has been carried out using current best practices, and against the criteria set out in the NPPF.

As such, and following an analysis of EA flood risk maps, recorded/modelled river levels, topographic and anecdotal information, it can be concluded that the risk and impact of flooding is currently moderate, but would be reduced following redevelopment.

As such, and given that:

a) the site lies within an existing developed area, and is for the demolition and replacement of an existing dwelling on a larger footprint;

b) the developer has agreed to incorporate undercroft void areas to the 1:100 year level plus 600mm, such that there will be no loss of flood storage post development providing a betterment over the existing situation;

c) finished ground floor levels will be set at least 600mm above the 1:100 year flood level;

d) a safe access and egress route will be provided by a formal flood warning and evacuation plan, which will be agreed with emergency planners, and tied in to the existing emergency plans for the area, and;

e) in terms of flood vulnerability, significant betterment can be achieved through the implementation of warning procedures, moving all sleeping accommodation to the first floor, and formalisation of a safe escape route,

following the guidelines contained within the NPPF, the proposed re-development is considered to be suitable assuming appropriate mitigation (including adequate warning and evacuation procedures) can be maintained for the lifetime of the development.

The findings and recommendations of this report are for the use of the client who commissioned the assessment, and no responsibility or liability can be accepted for the use of the report or its findings by any other person or for any other purpose.



Dr. J. B. Butler

B.Sc., M.Phil., PhD.

Ambiental Technical Solutions Ltd. April 2015

APPENDIX A – SUPPORTING INFORMATION

- Figure 1: Wider Location Plan;
- Figure 2: Detailed EA Flood Risk Map;
- Figure 3: Site location plan and topographic survey;
- Figure 4: Proposed plans;
- Figure 5: Revised plans including voids;
- Figure 6: EA JFLOW flood data.

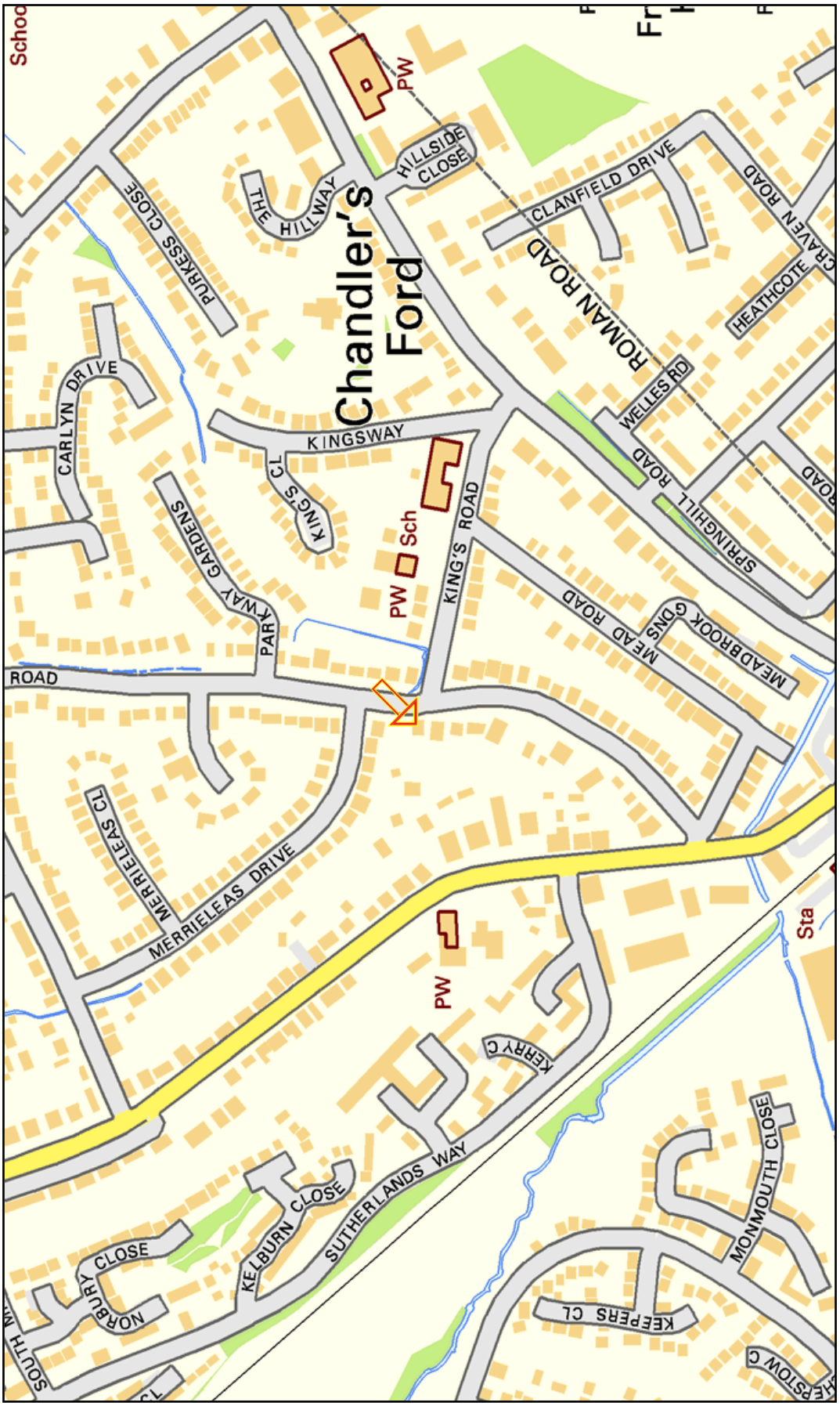


Figure 1: Wider Location Plan *(Source: Centre Maps)*

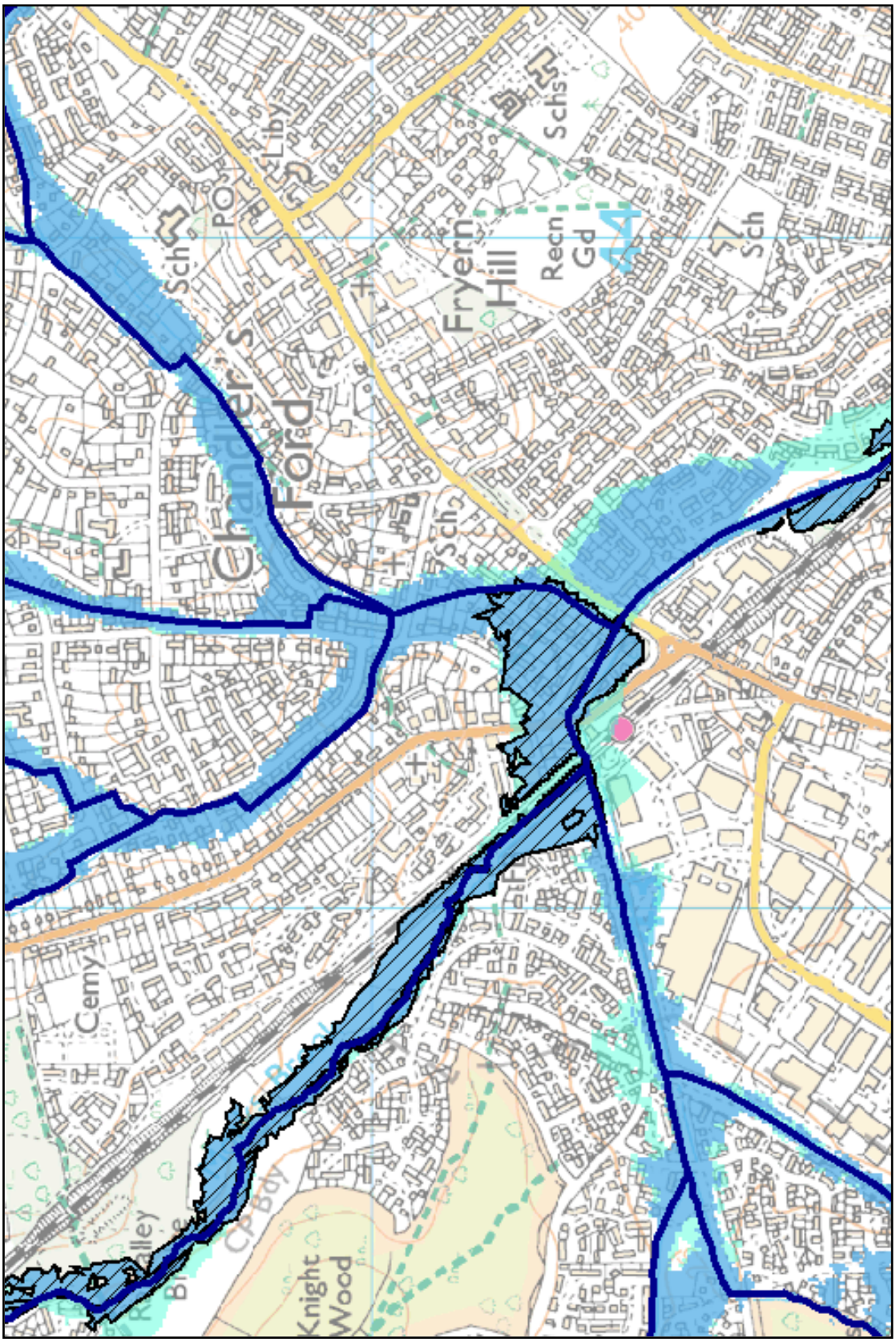
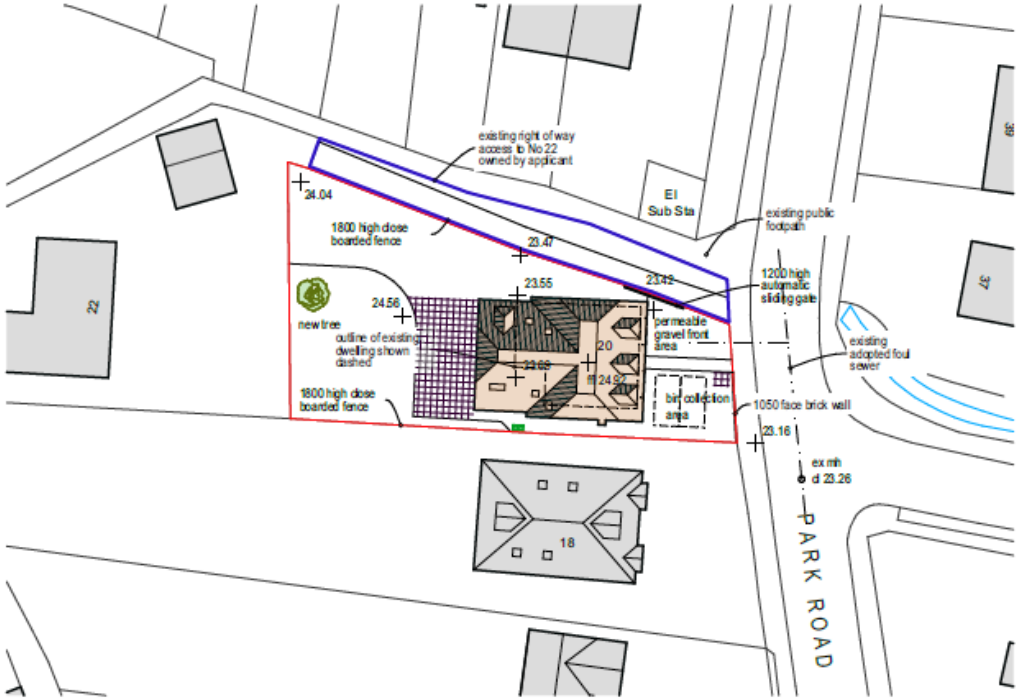


Figure 2: Detailed EA Floodmap *(Source: EA)*



street scene to park road 1 : 200



block plan 1 : 500

0 20

SCALEBAR 1 : 500 @ A3

0 1 2 3 4 5

SCALEBAR 1 : 200 @ A3

N

rev a 09.09.14 levels added

IAN WOOD DESIGN CONSULTANT

14 Garfield Road ♦ Bitterne ♦ Southampton SO19 4BZ ♦ Hampshire
Phone 023 8033 3810 or 01489 773569

Client MR & MRS G RHODES

Project 20 PARK ROAD
CHANDLERS FORD
HAMPSHIRE

Drawing Title BLOCK PLAN & STREET SCENE

Drawing GR3_02 Rev a
Date JUN 2014 Scale 1: 500 & 200@A3



front elevation

side elevation

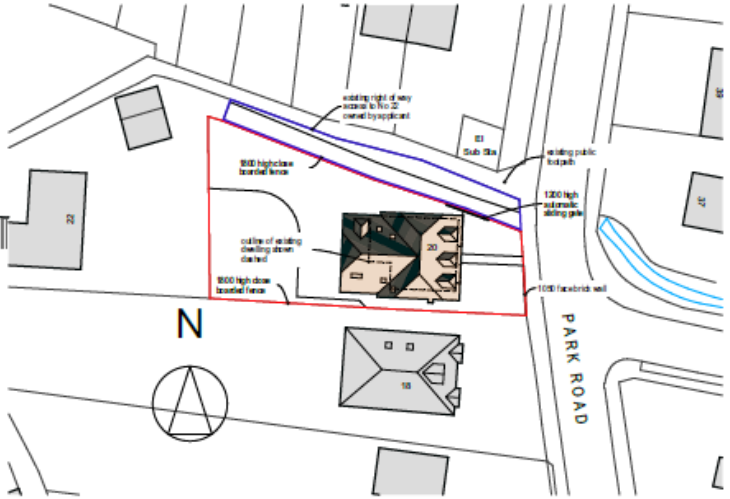


street view

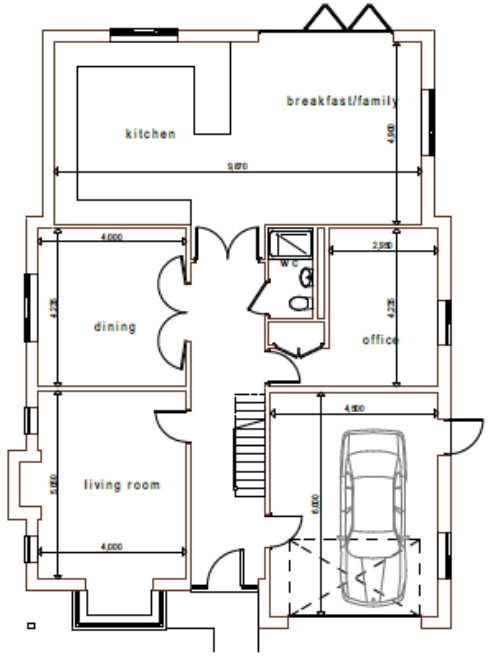


side elevation

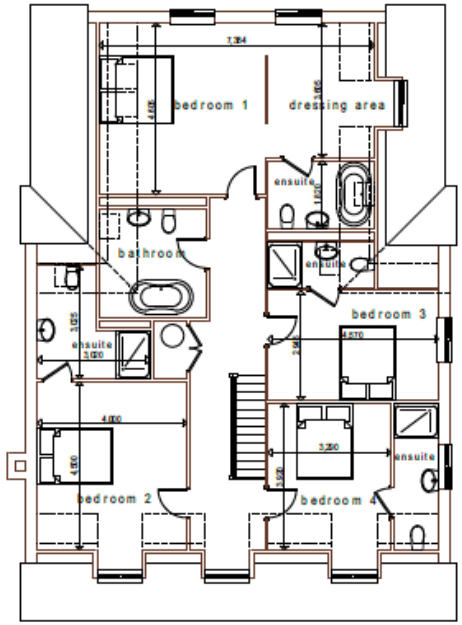
rear elevation



block plan 1 : 500



ground floor



first floor

IAN WOOD DESIGN CONSULTANT
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Phone 023 8033 3810 or 01489 773569

Client	MR & MRS G RHODES
Project	20 PARK ROAD CHANDLERS FORD HAMPSHIRE
Drawing Title	PROPOSED NEW DWELLING

Drawing	GR3_01	Rev	C
Date	NOV2013	Scale	1:100& 500



PROPOSED FRONT ELEVATION



PROPOSED SIDE ELEVATION



PROPOSED REAR ELEVATION



PROPOSED SIDE ELEVATION

No.
A 22/04/15
Flood level added
B 27/04/15
Drainage grills added

SCALE
1:100(A2)

Drawing No. | No.
15-PR-P3/B

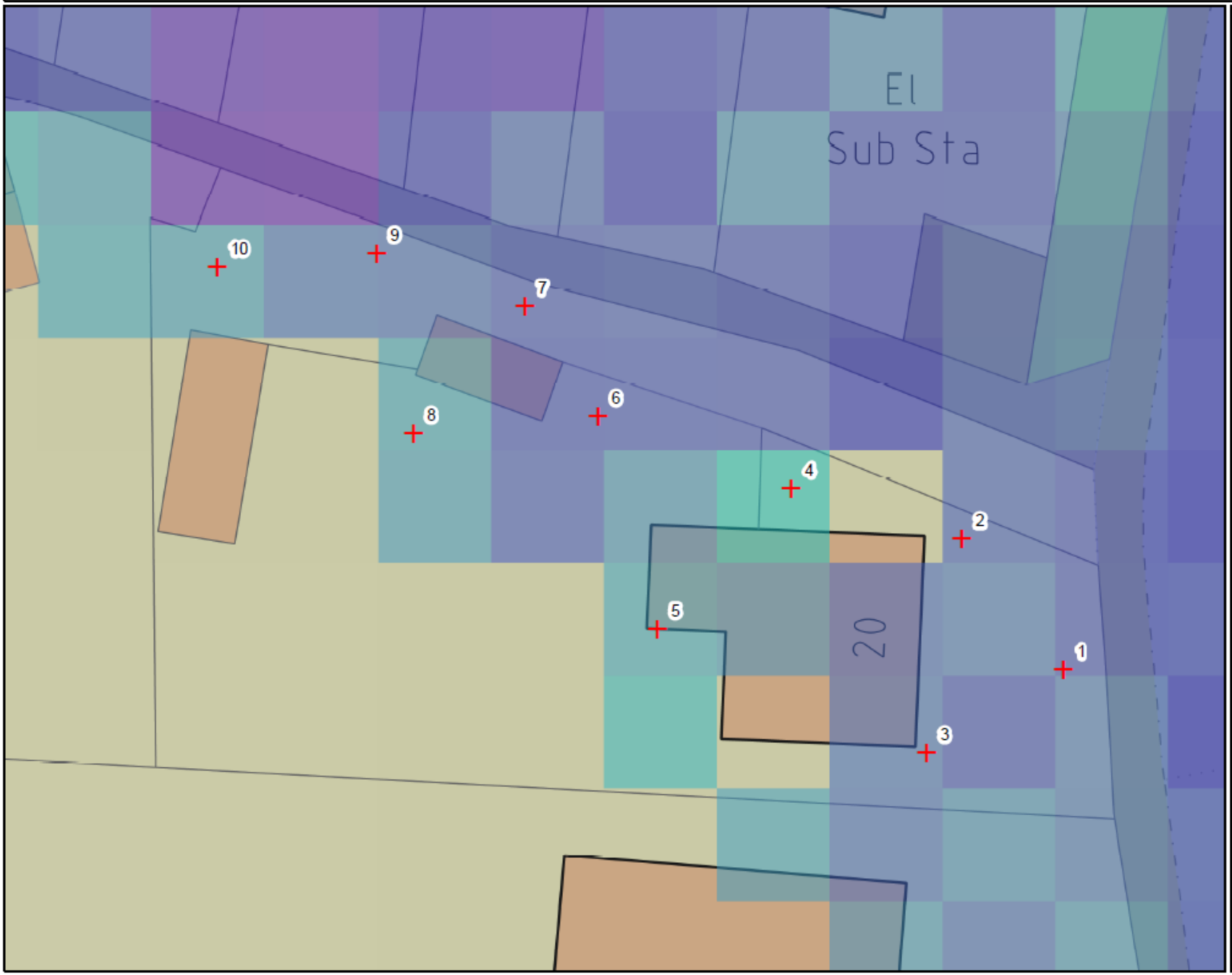
Date: 02-02-15
Drawn By: S Bernardez

Title
PROPOSED ELEVATIONS

Project
20 PARK RD
CHANDLERS FORD
EASTLEIGH

A&B Design 01794 368744
dave@aandbdesign.com

Flood Levels Centered on Park Road - Created 13 August 2014



Environment Agency

Legend

Location Points

Ground Level

Value

High

Low

Depth

Value

High

Low

1:246 *

*when printed at A4.

N

0 5 10

Metres

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Water Depths & Levels for Park Road - 2008 JFlow (SSD/4683)

	Water Depth (Metres)		Water Surface Level (mAOD*)		
Point	1% Annual Probability/1 in 100 Year (Flood Zone 3)	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	1% Annual Probability/1 in 100 Year (Flood Zone 3)	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	Ground Level
1	0.45	0.46	23.78	23.79	23.33
2	0.39	0.41	23.79	23.81	23.40
3	0.32	0.01	24.13	23.82	23.81
4	No Data	0.12	No Data	23.96	23.84
5	0.11	0.33	23.63	23.85	23.52
6	0.48	0.49	23.96	23.97	23.48
7	0.43	0.45	23.94	23.96	23.51
8	0.09	0.13	23.95	23.99	23.86
9	0.28	0.33	24.09	24.14	23.81
10	0.03	0.15	24.09	24.21	24.06

* Levels in metres above Ordnance Datum Newlyn

APPENDIX B – INFORMATION RELATING TO JFLOW

JFLOW and flood outlines (Source: EA)

Flood Zones have been produced using JFLOW, a nationally consistent model. JFLOW has been used to produce the 1% (1 in 100 year) and 0.1% (1 in 1000 year) flood outlines.

The flood outlines have been developed by applying flow and tide models to a 3D ground level map of England and Wales, known as a Digital Terrain Model (DTM). This is created by flying an aircraft over the whole of the country using radar to record and create a contoured model of the land. This DTM is used as the basis of a grid of cells which is used to estimate the extent of flooding in a flood of a given return period or probability.

The size of the flood event (1 in 100 or 1 in 100 year) is determined by the inflows to the JFLOW model, which are calculated using statistical techniques from the Flood Estimation Handbook. The technique used is based upon catchment descriptors and data transfer, the details of these can be found in the Flood Estimation Handbook volume 3. The Flood Estimation Handbook provides a consistent technique for estimating inflows to the national model and its methods are widely accepted.

The methodology is a raster-based approach, driven by an underlying Digital Elevation Model (DEM).

- Each cell has a ground level and water depth
- Water can move to any of surrounding 8 cells where the water level is lower
- Water will pond in low spots until the water level is high enough to spill
- The velocity of movement depends on water surface slope and surface roughness

The above points describe the basic principles of the model. The two underlying principles are:

- Mass conservation within each cell
- Calculation of the fluxes between the cells

Each grid cell is treated as a small storage area. Mass conservation is applied to each grid cell. The flux between cells is calculated using a form of the generalised weir equation.

Efficient coding is achieved by keeping a list of all currently wet cells and a list of newly wet cells. This avoids having to search through each cell in the ground grid.

For whole catchment modelling, the hydrographs used as inflow boundary conditions represent the whole hydrograph at that inflow location and a simple conceptual method has been derived to account for the amount of flow within the channel banks. A simple solution was therefore sought which would approximately account for the proportion of flow contained within the channel without requiring further information about the channel.

The simple conceptual method used involves two assumptions:

1. That bankfull flow (Q_b) is equal to QMED as calculated by the Flood Estimation Handbook (FEH) methods. QMED has a return period of 2 years. This assumption derives from the concept of dominant discharge in fluvial geomorphology (Wolman and Leopold, 1957; Wolman and Miller, 1960) where the cross-section shape is assumed to be formed by a discharge with a recurrence interval of 1-2years.

2. That the additional channel flow (Q_c) scales with both Q_b and depth above bankfull (d).

The basis of the current model is that each grid cell acts as a small flood cell and the links to each of the surrounding cells are automatically calculated. It is therefore capable of simulating the inundation extent at a level of detail equal to the underlying DEM. It is fundamentally volume conservative and so, in a given time period, will simulate the peak water levels across the floodplain depending on the volume of water that has entered the floodplain. This approach is a half-way house between the common 1D hydrodynamic models and a 2D hydrodynamic model.

Limitations

JFLOW was used to produce flood maps for the whole of England and Wales for all catchments greater than 3 sq km in a consistent manner. The method is therefore very generalised and therefore cannot take account of information that may be very significant locally. This might include:

1 Effects of bridges and other structures including flood defences are not taken into account.
2 Errors in the DTM, caused by trees and buildings for example.
3 The effect of reservoirs and urban drainage and other man made influences on the flow regime can only be taken into account in a very general sense in JFLOW.
4 The channel is assumed to be able to take the 2 year flow. This may not be true especially in those modified by man.
5 Hydraulic roughness is assumed to be the same everywhere in JFLOW, but of course it is not.

For these and many other reasons, the flood outlines produced by JFLOW can only be taken as a rough guide, showing where more detailed flood risk assessments are essential. Flood risk assessments should also be undertaken near small watercourses whose catchments are too small to have been included in the JFLOW modelling

APPENDIX C – ADDITIONAL INFORMATION

Significance	Risk of flooding of proposed development following completion	Impact of proposed development on both local and catchment hydrology
Not significant	Proposed development is not located in a 1:100 year fluvial or 1:200 year tidal floodplain. Flooding as a result of the accumulation of surface runoff either on-site, or elsewhere in the catchment is highly unlikely.	Proposed development does not affect the quantity/quality of surface runoff and does not alter surface/groundwater flow locally or elsewhere within the catchment.
Low significance	Proposed development is located in a 1:100 year fluvial/1:200-year tidal floodplain, although no mitigation measures are required due to regional flood defences. Existing local drainage measures are sufficient to ensure that the accumulation of surface runoff does not result in flooding on-site or increase the risk of flooding elsewhere within the catchment.	Proposed development has a minor affect on the quantity/quality of surface runoff or surface/groundwater flow either locally or elsewhere within the catchment. Such changes may be sustainable without mitigation measures.
Moderately significant	Proposed development is located in a 1:100 year fluvial/1:200-year tidal floodplain and mitigation measures are required to reduce flood risk to an acceptable level. Surface runoff attenuation methods may be required to ensure that the accumulation of surface runoff does not result in flooding on-site or increase the risk of flooding elsewhere within the catchment.	Proposed development has a notable affect upon the quantity/quality of surface runoff and has a discernable impact upon surface/groundwater flow either locally or elsewhere within the catchment. Mitigation measures may be required in order for the development to be sustainable throughout the duration of its intended lifetime.
Moderate-high significance	Proposed development is located in a 1:100 year fluvial/1:200-year tidal floodplain and significant mitigation measures are required to reduce flood risk to an acceptable level. A range of surface runoff attenuation methods will be required to ensure that the accumulation of surface runoff does not result in flooding on-site or increase the risk of flooding elsewhere within the catchment.	Proposed development has a large affect on the quantity/quality of surface runoff and has a considerable impact upon surface/groundwater flow either locally or elsewhere within the catchment. A primary commitment to successful mitigation measures will be required in order for the development to be sustainable throughout the duration of its intended lifetime.
Highly significant	The proposed development is considered to be particularly susceptible to either tidal or fluvial flooding or a combination of both. Resultant changes in the rates of surface runoff as a result of the development will increase flood risk both on-site and elsewhere in the catchment. The incorporation of even a wide range of practicable mitigation measures may not ensure that the development remains sustainable in terms of flood risk for the duration of its intended lifetime.	Proposed development has a major affect on the quantity/quality of surface runoff and has a severe impact upon surface/groundwater flow locally or elsewhere within the catchment. The incorporation of even a wide range of practicable mitigation measures may not ensure that the development remains sustainable throughout the duration of its intended lifetime.

Table C1: Explanation of the levels of Significance used for the Flood Risk Assessment